UNIVERSITY OF TORONTO
3 1761 00845205 4

Digitized by the Internet Archive
in 2018 with funding from
University of Toronto

https://archive.org/details/fibrositisgoutyi00llew

59

247
2

FIBROSITIS

MODERN BONESETTING
FOR THE
MEDICAL PROFESSION

BY

FRANK ROMER
M.R.C.S.E., M R.C.P Lond.
SURGEON LONDON GUARANTEE AND ACCIDENT CO.
HON. SURG. ROYAL ACADEMY OF MUSIC
HON. SURG. BOOKSELLERS' BENEVOLENT SOCIETY

In One volume, Demy 8vo. Illustrated from Special Photographs. Price 5s. net

LONDON: WILLIAM HEINEMANN

MPr
L

DUPLICATE

FIBROSITIS

(*GOUTY*, *INFECTIVE*, *TRAUMATIC*)

SO-CALLED CHRONIC RHEUMATISM
INCLUDING VILLOUS SYNOVITIS OF KNEE
AND HIP, AND SACRO-ILIAC RELAXATION

BY

LL.ewellyn JONES LLEWELLYN
M.B. (LOND.)
SENIOR HONORARY PHYSICIAN
ROYAL MINERAL WATER HOSPITAL, BATH

AND

A.rthur BASSETT JONES
M.B. (LOND.)
LATE SENIOR HONORARY SURGEON
CARDIGANSHIRE GENERAL HOSPITAL

462475.
31.5.47

LONDON
WILLIAM HEINEMANN

LONDON: WILLIAM HEINEMANN, 1915.

DEDICATED BY PERMISSION

TO

SIR BERTRAND DAWSON, K.C.V.O., M.D., F.R.C.P.

PREFACE

ALTHOUGH the subject of chronic rheumatism has from time immemorial engaged the attention and stimulated the inquiry of thoughtful physicians, there is perhaps no disorder concerning the nature of which speculation has been so rife, and the treatment of which has for so long been conducted on frankly empirical lines.

Nor is this to be marvelled at when we reflect that, by the too ready acceptance of "chill" as its all-sufficient proximate cause, physicians had, so to speak, voluntarily dissociated themselves from that analytical method of research which alone could lead to accurate observation and rational interpretation of the local and constitutional phenomena characteristic of chronic rheumatism. Indeed, so deeply were they imbued with the view that cold and inflammation consequent thereon were the alpha and omega of the disorder, that any facts militating against this conception were disregarded or held of little account.

Obsessed by this conception of its causation, they failed to approach the study of the disease in that spirit of inquiring scepticism which impels the mind to subject to critical analysis all previous hypotheses as to the nature and etiology of the affection.

This passive acquiescence on their part naturally arrested the progress of knowledge regarding the disorder, and, its origin remaining so enveloped in doubtful theory, it is scarcely to be wondered at that the principles of its treatment were equally unsettled and involved in prejudice—hence the field *par excellence* afforded by rheumatism for the exercise of empiricism.

Still, while these strictures may legitimately apply to the writings of ancient physicians, it is pleasing to record that those of the earlier part of the nineteenth century displayed a laudable restiveness under these self-imposed shackles of authority and tradition.

Dissatisfied with the current pathological conceptions of the disorder, they, in accordance with the dictum enunciated by Morgagni, sought to link up the subjective phenomena of chronic rheumatism with certain organic changes in the anatomical textures attacked by the morbid process. In this way the chaff was winnowed from the grain, and the illusions of false or mistaken philosophy were gradually displaced by the substantial forms of truth.

Indeed, bringing candid eyes to the perusal of the writings of Craigie and those of his school, we realize that modern students have paid too scant justice to the shrewdness of their clinical insight and conjecture as to the pathology of chronic rheumatism. For it was amongst them all an accepted pathological axiom that the morbid changes peculiar to all forms of this disorder were located in the fibrous textures, which permeated and welded together the component parts of the body fabric.

In this way they introduced a unity to the numerous isolated and unarranged facts recorded by different observers, reconciled what was discordant, and explained what was anomalous; in short, grasped the essential pathological groundwork of that vast medley of clinical entities comprised under the term "chronic rheumatism."

Now, despite the fact that endless treatises have been devoted to acute rheumatism, and not a few to that now expurgated group, arthritis deformans, yet we are unaware of any one solely restricted to the consideration of chronic rheumatism, which even in the classic treatise of Fuller (1860) was accorded relatively meagre notice.

But if judged by its incidence, and the amount of bodily suffering and crippledom it occasions, there can be no doubt that this disorder fully deserves the same degree of attention as has been bestowed upon the so-called allied affections. On these two counts, indeed, we need proffer no apology for essaying a work on this subject, for in one or other of its guises chronic rheumatism, next to respiratory disorders, is one of the most prevalent diseases in the United Kingdom, while it harasses and disables no small section of the community.

The relative dearth of works on this subject is, we think, in the main attributable to the fact that, until quite recently, all views as to its anatomical basis were purely speculative, and naturally this engendered a certain diffidence in dealing with its manifestations.

But during the past two decades, owing to the labours of both English and Continental pathologists, this disability has been largely removed, and the anatomical substratum of the disease having now been fairly ascertained, we were of opinion that a work on this subject was not only legitimately possible, but might be of practical value.

Our designation of this disorder by the term " fibrositis " is, indeed, a tribute to our more exact knowledge regarding the morbid anatomy of chronic rheumatism.

As to the scheme pursued in the work, we have opened our subject by indulging in an historical retrospect, which had for its end the object of defining what clinical entities we proposed to include under this appellation. For, as a perusal of this chapter will readily disclose, there is a great difference between what disorders *ought* to be, and what disorders actually *are*, commonly regarded as manifestations of chronic rheumatism. We lay stress on this point, for herein lies the clue to our division of this work into three main sections :

1. Infective or toxic fibrositis.
2. Traumatic varieties of fibrositis.
3. Static disorders falsely yclept " rheumatic."

Under the last-named group we have discussed in detail villous changes in the hip and knee, and sacro-iliac strain or relaxation.

In regard of the infective or toxic type of fibrositis, we have divided it into three—the articular, muscular, and neuralgic varieties, respectively. The etiology of these various types has been considered concurrently from the point of view of the essential or proximate causes, as well as those exciting or determining factors responsible for relapses or exacerbations.

As to the ultimate causation of the disorder in all its protean forms, our own experience leads us to assign great potency to gout as a factor predisposing to the development of fibrositis. As to its *modus operandi*, we have advanced the view that in all probability the alimentary derangements so commonly associated with this constitutional taint in some obscure way favour the occurrence of subinfection from some focus in the alimentary canal.

In other words, we believe that not only the articular, but also the muscular and nerve, types of chronic rheumatism are the outcome of infection by germs of attenuated virulence.

In regard of the exciting causes, we assign the chief place to " chill," sore throats, and alimentary derangements, while in the case of the muscular types there is little doubt that excessive as well as insufficient muscular exercise are often responsible for recurrences or exacerbations.

In the chapter on morbid anatomy we have again dealt in detail with these three types respectively, and have supplemented the anatomical investigations made in man by the results of similar researches on chronic rheumatism as it occurs in animals.

Subsequently we have proceeded to describe seriatim the clinical symptoms and phenomena of these several varieties, and in addition their diagnosis, differential diagnosis, and prognosis have been discussed, and with great detail, because of the many sources of fallacy connected with a too hasty or flippant application of the term "rheumatic" to any painful disorder.

In the therapeutic domain we have devoted one chapter to a consideration of those general principles of treatment which are germane or applicable to all infective or toxic types of fibrositis, and which are directed to the eradication or amelioration of the essential or proximate causes of the disease.

In the succeeding three chapters the local therapy of the articular, muscular, and nerve types of the affection have been fully considered.

As far as possible we have, throughout the sphere of treatment, adopted the plan, which we hope will be useful, of giving details of technique in regard of the various modes of treatment, such as hydro-therapy, hyperæmia, electro-therapy, vaccine-therapy, and so forth.

In the second main section—traumatic fibrositis—we have, within the limits of this work, treated exhaustively with the effects of strain or rupture of muscles, as met with in the trunk and limbs.

A separate chapter has been devoted to that most important variety, traumatic lumbago, in which disorder modern methods of investigation, chiefly skiagraphy, have disclosed an astonishing diversity of hitherto unsuspected lesions.

Here, too, because of the frequency with which claims are lodged for compensation, we have interpolated a chapter on the detection of fraud in this, the disorder *par excellence* affected by malingerers.

In the same section, too, have been treated those forms of subacute rheumatic synovitis in the production of which trauma plays so predominant a rôle; while affections of the bursæ of similar origin, notably subacromial bursitis, have also as far as possible been adequately described.

We have here, as in other portions of the work, attempted, because of the difficulty attending the recognition of these traumatic lesions of joints and their related muscles and bursæ, to clearly define their salient features and differential diagnosis.

In the terminal section are described those static disorders, the related pains and aches of which are with such deplorable frequency confounded with "rheumatism."

Separate chapters are devoted to villous synovitis of the knee and hip, and special stress has been laid on the possibility that such villous changes constitute the preosteophytic stage of osteo-arthritis in these articulations.

The allied disorder, sacro-iliac strain, has been subsequently dealt with, while the diagnosis, prognosis, and treatment of these three disorders have received adequate consideration.

Having outlined in brief the contents of this volume, we now pass on to perform the pleasant duty of thanking those who have so generously assisted us in its production.

We have in the first place to acknowledge our great indebtedness to Professor Stockman of Glasgow, and Dr. Rosenow of Chicago, the former for the plates contained in the chapter on morbid anatomy, and the latter for those in the section on general etiology. We gladly tender our thanks to Professor Starling for Plates 27 and 28 which appeared originally in the author's work on "Physiology"; also to Dr. Henry Head for Plates 75 and 76 from Allbutt's "System of Medicine"; and to Dr. Higham Cooper for certain skiagrams. To Dr. Bowker and Dr. McKay we are indebted for the skiagrams taken of cases in the Royal Mineral Water Hospital, Bath, and elsewhere, and also to Dr. Almond and Dr. Merewald for generous assistance.

Our gratitude is due to the honorary staff of the Royal Mineral Water Hospital, Bath, and the Cardiganshire General Hospital for the facilities afforded us for examining cases under their care.

To the authorities of the Royal College of Surgeons, and those of University College Medical School, our thanks are due for photographs of such of their pathological specimens as appeared relevant to the subject-matter of this volume. For the preparation of the Index attached to this work we have to thank Mr. Charles Hewitt.

We would record, too, our appreciation of the unfailing courtesy of our publisher, Mr. Heinemann, and we gladly acknowledge the help afforded us by his skilled advice as to the production of this work and our indebtedness to him for permission to reproduce certain anatomical plates culled from Toldt's Atlas.

In conclusion, to our friend, Mr. W. M. Beaumont, of Bath, our very sincere thanks are due, not only for many valuable suggestions as to the substance and arrangement of the text, but also for the extreme care with which he performed the tedious task of revising the proofs of this work.

Ll. J. Ll. A. B. J.

CONTENTS

CHAPTER I

INTRODUCTION AND HISTORICAL RETROSPECT

PAGES

Process of differentiation—Identification of acute rheumatism—Differentiation of acute, chronic, and muscular rheumatism—Chill wrongly regarded as the sole cause of rheumatism—Withdrawal of arthritis deformans and Charcot's joints from the rheumatic category—Elimination of the infective arthritides—Modern significance of the term "rheumatism"—Clinical content of so-called "chronic rheumatism"—Joint affections usually included under chronic articular rheumatism—Traumatic and static types of arthritis erroneously regarded as "rheumatic"—"Rheumatic" affections of bursæ—Muscular rheumatism—Infective types—Traumatic types—Static types—Neuralgic rheumatism—Infective types—Traumatic types—Static types of brachialgia and sciatica—Conclusions regarding the clinical content of chronic rheumatism—Substitution of the term "fibrositis" for "chronic rheumatism"—Synopsis and arrangement of subject - 1-15

INFECTIVE OR TOXIC FIBROSITIS

CHAPTER II

GENERAL ETIOLOGY: PRIMARY OR ESSENTIAL CAUSES

Age and sex incidence—Fibrositis of the joints—Fibrositis of the muscles, not including lumbago—Lumbago—Sciatica—Conclusions—Gout—Incidence of gouty stigmata in various types of fibrositis—Summary—Exposure to action of lead—Heredity—Infections—Analogies between chronic rheumatism and specific infections—Arthritic types—Muscular types—Neuralgic types—Associated clinical phenomena suggestive of the infective origin of chronic rheumatism—Gastro-intestinal derangements—Local foci of toxic absorption—Diminution or absence of free HCl—Excess of HCl—Intestinal indigestion—Urinary changes—Relationship of urinary to gastric acidity—Urinary hypo-acidity—Positive bacteriological data in favour of infective origin—Examination of joint fluids—Cytology of joint fluids—Latent infection—Incidence of the tuberculous and syphilitic infections in cases of multi-articular arthritis of indeterminate causation, and in sciatica—Experimental data in support of infective origin of the lesions in chronic rheumatism—Survey of the preceding sections—Are the symptoms of chronic rheumatism explicable by autotoxæmia of gastro-intestinal origin?—Evidence in favour of chronic rheumatism being of infective origin—Theory of subinfection—Theories of autotoxæmia and subinfection not necessarily incompatible—Summary of etiological factors - 17-60

CHAPTER III

GENERAL ETIOLOGY : DETERMINING OR EXCITING CAUSES

PAGES

Atmospheric influences—Exciting and not original causes—Exposure to cold—Exposure to wet—Combined wet and cold—Variations in barometric pressure—Analogies with caisson disease—Radio-activity of atmosphere — Winds — Climate — Unhygienic surroundings — Soil—Rheumatism in animals—Influence of occupation—Table of occupations — Fibrositis of joints — Muscular fibrositis — Lumbago—Sciatica—Environmental circumstances of occupation—Production of chill—Failure of individual adjustment—Action of draughts—Certain types of fibrositis especially liable to ensue after chill—Pathogeny of chill—Muscular overaction—Excessive muscular katabolism—Influence of cold on muscular katabolism—Insufficient muscular exercise—Excessive intake of food—Influence of occupation and other factors in localizing the seat of the affection—Arthritic types—Muscular types—Neuralgic types—Other determining causes of relapses or exacerbations—Summary of determining or exciting causes - - - - - - - - 61–88

CHAPTER IV

FIBROSITIS, OR CHRONIC RHEUMATISM: MORBID ANATOMY

Articular fibrositis—*Rhumatisme chronique fibreux*—Articular lesions—Changes in the muscles—Visceral changes—Conclusions—Muscular fibrositis—Virchow's view—Pathological changes in excised muscles—Macroscopic appearances—Microscopic appearances—Stockman's and Renton's researches—Macroscopic appearances—Microscopic appearances—Subcutaneous nodules—Periosteal nodules—Comparative morbid anatomy—Researches in horses—Researches in dogs—Summary—Neurofibrositis, or fibrositis of the nerve sheaths - 89–105

CHAPTER V

(A) ARTICULAR FIBROSITIS, OR CHRONIC ARTICULAR RHEUMATISM

Classification—Arthralgic type—Fleeting arthralgia of erratic distribution—Clinical account—Mode of onset—Local symptoms—Fixed arthralgia (monarticular) — Osteo-periosteal neuralgia—Peri-arthritic type—Clinical account—Introductory remarks—Mode of onset—General symptoms—Distribution of joint-lesions—Character of joint lesions—Local symptoms and phenomena—Course and termination—Chronic fibrous rheumatism—Localized variety—Articular type—Fascial type—Etiology—Clinical features—Generalized or polyarticular variety—Benign form—Malign form (Jaccoud's type) 107–132

CHAPTER VI

DIAGNOSIS

General considerations—Etiological diagnosis—Diagnosis of articular fibrositis, or chronic articular rheumatism—Arthralgic type—Fleeting arthralgia of erratic or nomadic incidence—Fixed arthralgia (mon-

PAGES

articular)—Joint neuroses—Osteo-periosteal neuralgia—Peri-arthritis, or infective arthritis of undifferentiated type—Differential diagnosis—Acute articular rheumatism—Acute rheumatoid arthritis—Forms of arthritis referable to some specific infection—Gonorrhœal arthritis—Secondary syphilitic arthritis—Chronic tuberculous rheumatism—Non-infective types of arthritis—Hæmophilic arthritis—Nerve arthropathies—Chronic fibrous rheumatism—Localized varieties—Articular types—Fascial type—Generalized varieties—Benign form—Malign type—Differential diagnosis—Subacute articular rheumatism—Gonorrhœal polyarthritis—Chronic rheumatoid or atrophic arthritis—Generalized osteo-arthritis—Chronic polyarticular gout—Skiagraphy—Infective arthritis—Rheumatoid or atrophic arthritis—Osteo-arthritis—Chronic gout—Chronic articular rheumatism—Prognosis 133–149

CHAPTER VII

(B) MYO-FIBROSITIS, OR MUSCULAR RHEUMATISM

Introductory remarks—Definition—Nomenclature—Classification—Plan of procedure in dealing with the subject of muscular fibrositis - 151–157

CHAPTER VIII

ACUTE MYO-FIBROSITIS: GENERALIZED TYPE

Clinical account—Mode of onset and course—Local phenomena - 158–161

CHAPTER IX

ACUTE MYO-FIBROSITIS: LOCALIZED TYPES

General clinical features—Mode of onset—Subjective symptoms—Characteristics of pain—Passive movements—Synergic action—Objective changes in muscles—Alteration in tone—Increase in volume—Local rise of temperature—Course of disease—Complications - 162–169

CHAPTER X

CHRONIC MYO-FIBROSITIS

General clinical features—Site of pain—Character of pain—Objective phenomena—Panniculitic deposits—Myositic deposits—Muscle nodules or indurations—Form and site—Consistency—Tendon nodules—Symptoms in relation to nodules—Hypertonus—Complications and secondary effects - - - - - - 170–181

CHAPTER XI

PHYSICAL EXAMINATION OF NODULES IN MYO-FIBROSITIS

Method of technique—Panniculitic deposits—Periosteal nodules—Examination of muscles—Arrangement of patient—Mode of palpation—Acute stages—Chronic stages—Tendon nodules—Differential diagnosis—Localized muscular contractions—Swollen glands—Varicose veins - - - - - - - - 182-186

CHAPTER XII

MUSCULAR FIBROSITIS: PATHOGENY

PAGES

General remarks—Histology of muscles—Physiology of muscles—Anatomy of muscle-spindles—Organs of Ruffini and Golgi—Muscular tone—Proprioceptive impressions—Altered reaction of rheumatic muscle—Intensity of response—Influence of passive movements—Influence of synergic action—Bearing of reciprocal innervation of antagonistic muscles—Reaction of rheumatic muscles to exertion—Reaction to rest—Exteroceptive impressions—Stimuli of pressure—Variations in temperature—Variations in atmospheric pressure—Summary 187-197

REGIONAL OR LOCALIZED VARIETIES

CHAPTER XIII

MUSCULAR FIBROSITIS: REGION OF THE HEAD AND NECK

Acute muscular torticollis: Definition—Etiology—Clinical account—Mode of onset—Subjective symptoms—Constitutional symptoms—Objective phenomena—Nodules—Vicious attitudes—Course of disease—Complications. Acute articular torticollis: Clinical features—Course of disease. Acute torticollis: General diagnosis—Acute muscular torticollis—Acute articular torticollis—Differential diagnosis—Reflex torticollis—Trauma—Infective arthritis of cervical vertebræ—Cervical caries—Burns—Congenital torticollis—Spasmodic torticollis. Chronic cervical fibrositis: Chronic torticollis—Etiology—Anatomical changes Clinical account—Mode of onset—Subjective symptoms—Pain—Objective phenomena—Course and remote effects—Diagnosis—Differential diagnosis — Rheumatoid or atrophic spondylitis — Osteo-arthritic or hypertrophic spondylitis. Cephalalgia rheumatica: Site of nodules—Clinical account—Diagnosis - - - 199-215

CHAPTER XIV

REGION OF UPPER EXTREMITY

Acute brachial fibrositis: Etiology—Clinical account—Complications—Extension to joints—Nerve sheath-involvement—Course and duration—Diagnosis—Differential diagnosis—Brachial neuralgia—Brachial neuritis—Arthritis deformans of cervical column—Hypertrophic type—Atrophic type—Hypertrophic cervical pachymeningitis—Cervical caries and malignant disease of cervical column—Referred visceral pain. Chronic brachial fibrositis: Etiology — Clinical account—Nodules in the biceps—Myositis in the forearm—Course and duration—Diagnosis — Differential diagnosis — Occupation myalgias — Static brachialgias—Osteo-arthritis of the shoulder—Referred pains from visceral disorders—Bicipital bursitis—Von Recklinghausen's disease 216-229

CHAPTER XV

ACUTE LUMBAGO

Anatomical considerations — Etiology — Clinical account — Prodromal symptoms—Mode of onset—Constitutional symptoms—Subjective symptoms—Site of pain—Character of pain—Lumbago in animals—Objective phenomena—Course of disease and complications—General diagnosis—Acute lumbago—Differential diagnosis—Traumatic lum-

PAGES

bago—Strain or rupture of muscles—Strain of sacro-iliac ligaments—Specific infectious disorders — Herpes zoster — Lumbo-abdominal neuralgia—Acute lumbar osteomyelitis—Osteomyelitis of sacrum 230–243

CHAPTER XVI

CHRONIC LUMBAGO

Etiology—Clinical account—Objective phenomena—Muscle indurations—Tendon nodules—Course of disease—General diagnosis—Analysis of history—Physical examination—Inspection—Site of pain—Distribution of pain—Static alterations—Palpation—Investigation of mobility—Examination of urine—Simple chronic lumbago—Differential diagnosis—Traumatic lumbago—Static lumbago—Backache of constipation—Backache of oxaluria—Bacteriuria—Renal calculus—Backache from pelvic disorders in women—Lumbar caries—Atrophic arthritis of spine — Hypertrophic arthritis of lumbar spine — Osteo-arthritis of sacro-iliac synchondrosis—Malignant disease of lumbar spine—Hyperæsthetic spine—Abdominal aneurysm—Lumbar type of intermittent claudication—Traumatic myositis ossificans - 244–254

CHAPTER XVII

PLEURODYNIA AND DORSODYNIA

Pleurodynia: Clinical account—Site of pain—Character of pain—Objective signs — Differential diagnosis — Pleurisy — Intercostal neuralgia—Herpes zoster—Referred visceral pains. Dorsodynia: General remarks—Differential diagnosis—Lateral scoliosis—Round shoulders and occupation kyphoses—Malpositions of scapula—Malformations of scapula—Visceral disorders - - - - - 255–262

CHAPTER XVIII

FIBROSITIS OF ABDOMINAL MUSCLES

Introductory remarks—Original description—Etiology—Clinical account—General symptoms—Local symptoms and signs—Site of pain—Character of pain—Site of nodules—Course of disease—Complications—Diagnosis—Differential diagnosis—Appendicitis—Diseases of the gall-bladder — Pleurisy — Lumbo-abdominal neuralgia — Diaphragmatic fibrositis - - - - - - - - 263–272

CHAPTER XIX

REGION OF LOWER EXTREMITY: GLUTEAL AND CRURAL FIBROSITIS

Introductory remarks—Gluteal fibrositis—Anatomical peculiarities—Etiology—Clinical account—Site of pain—Objective phenomena—Site of nodules—Crural fibrositis—Upper segment of limb or thigh—Anatomical considerations—Subjective symptoms—Objective phenomena—Site of nodules—Lower segment of limb or leg—Subjective symptoms—Objective phenomena—Site of nodules—Diagnosis—Detection of nodules—Differential diagnosis—Occupation myalgias—Local and referred pains of flat-feet, etc.—Hallux valgus—Metatarsalgia—Painful heel—Neurasthenia—Syphilitic osteal pains—Alcoholism—Fibrositis of the visceral muscular tissues—Chronic pharyngitis—Myocardial lesions—Ocular and other forms of fibrositis - 273–289

CHAPTER XX

MUSCULAR FIBROSITIS

PAGES

Prognosis—Constitutional or diathetic state—Nature and extent of the anatomical lesions—Occupation, habits, and environmental circumstances - - - - - - - - 290-292

CHAPTER XXI

(C) NEURO-FIBROSITIS, OR FIBROSITIS OF THE NERVE SHEATHS

Historical retrospect—Nomenclature—Neuralgia *v.* neuritis - 293-299

CHAPTER XXII

SCIATICA

Etiology—General considerations—Primary sciatica—Predisposing and proximate causes—Age and sex incidence—Limb incidence—Occupation—Neuropathic inheritance—Gout—Senility and arterio-sclerosis—Diabetes and other toxic causes—Infections—Syphilis—Gonorrhœa—Malaria—Tuberculosis—Secondary sciatica—Extra-pelvic causes—Trauma—External pressure—Overextension of the nerve trunk—Osteo-arthritis of hip—Gluteal and crural types of fibrositis—Static causes—Intrapelvic causes—Fæcal stasis—Pregnancy—Intrapelvic neoplasms—Varicosity of nerve sheath—Appendicitis—Perimetritis—Disease of the pelvic bones—Tuberculous or osteo-arthritic disease of sacro-iliac synchondrosis—Disease of vertebral column—Bilateral sciatica—Tumours of spinal cord, sacrum, or pelvis—Lesion of nerve roots, cauda equina, or spinal cord—Diabetes—Exciting causes—Exposure to cold—Excessive muscular exertion—Functional derangements of the gastro-intestinal tract—Classification—Anatomical relationships of the great sciatic nerve - - - - 300-311

CHAPTER XXIII

TRUNK SCIATICA: CLINICAL ACCOUNT OF SCIATIC NEURALGIA AND SCIATIC NEURITIS

Sciatic neuralgia—Mode of onset—Features of paroxysm—Site of pain—Spontaneity and additional features of pain—Objective phenomena—Absence of tenderness of nerve trunk to pressure—Fibrous nodules—Motor phenomena—Absence of muscular atrophy—Abnormalities in gait—Absence of sensory and trophic changes—Course and remote general effects—Sciatic neuritis—Mode of onset—Subjective symptoms—Site of pain—Path of pain—Character of pain—Aggravating factors—Course of disease - - - - - 312-319

CHAPTER XXIV

TRUNK SCIATICA: DETAILED CONSIDERATION OF CLINICAL PHENOMENA

Objective phenomena—Tenderness of nerve trunk—Location and detection of so-called "tender points"—Sensitiveness of the nerve to extension—Diagnostic manœuvres—Gowers's test—Lasègue's sciatic

PAGES

phenomenon—Trunk flexion method—Contralateral sign—Bonnet's sign—Erben's sign—Sensitiveness of the psoas muscle to pressure or extension—Gara's method—Plate's method—Intrapelvic tenderness—Location of fibrous nodules—Postural adaptations and alterations in gait—Steppage gait—Pose when recumbent—Mode of sitting—Sensory disorders — Paræsthesiæ—Anæsthesia—Motor phenomena—Muscular weakness—Muscular atrophy—Hypotonia—Alteration in reflex reactions—Electrical reactions—Vasomotor and trophic phenomena—Local chilling—Subcutaneous adiposity—Aspect of skin—Duration—Complications of sciatica—Extension of morbid process—Remote secondary effects - - - - - - 320-334

CHAPTER XXV

SCIATIC SCOLIOSIS

Classification—Mode of evolution—Descriptive account—Heterologous or crossed scoliosis—Homologous or reciprocal scoliosis—Alternating scoliosis—Additional features — Pelvic displacements—Rare pelvic distortions — Rotation of trunk — Detection of crossed scoliosis—Factors influencing existence of scoliosis—Suggested modes of origin—Crossed scoliosis—Ehret's view—Mann's view—Plate's hypothesis—Homologous scoliosis—Nicoladoni's view—Brissaud and Lamy's view—Bruhl and Soupault's view—Fischer and Schoenwald's view—Sources of fallacy - - - - - - 335-342

CHAPTER XXVI

INCOMPLETE OR PARTIAL TYPES OF TRUNK SCIATICA; BILATERAL SCIATICA; ALSO THOSE OF SPECIAL ETIOLOGY

Incomplete or partial types of sciatica—Peroneal or external popliteal type—Etiology—Infections—Trauma—Compression—Clinical symptoms—Neuritis of small sciatic nerve—Neuritis of posterior tibial nerve—Anterior tibial branch—Plantar neuralgia—Trunk sciatica of bilateral distribution—Etiology—Toxic agencies—Gout—Lesions of cauda equina or spinal cord—Lesions of the spinal meninges—Malignant and tuberculous disease of spine or sacrum—Bilateral osteo-arthritis of hip—Intrapelvic growths and inflammatory processes—Clinical peculiarities—Special types of sciatica—Diabetic sciatica—Sciatic neuralgia — Sciatic neuritis — Gonorrhœal sciatica — Acute type—Chronic type—Varicose sciatica—Anatomical considerations—Symptoms—Brissaud's spasmodic type—Hysterical sciatica—Mode of onset—Symptoms - - - - - - 343-350

CHAPTER XXVII

RADICULAR SCIATICA

Etiology—Syphilis—Other etiological factors—Gonorrhœa—Tubercle—Sex—Clinical account—Subjective symptoms—Site of pain—Objective sensory changes—Hyperæsthesia—Hyperalgesia—Hypoæsthesia—Anæsthesia—Muscular system—Atrophy—Superficial and deep reflexes—Cough sign—Homologous scoliosis—Additional features—Kernig's sign—Pupillary inequality—Foot clonus—Summary of clinical phenomena - - - - - - - - 351-358

CHAPTER XXVIII

SCIATICA: DIAGNOSIS

PAGES

Introductory remarks—Topographical diagnosis—Site of pain—Characteristics in sciatica, hip-joint disease, and gluteal fibrositis—Simultaneous anterior crural and sciatic pains—Characteristics of sciatic neuralgia—Features of sciatic neuritis—Differentiation of primary and secondary sciatica—Distinction of trunk from radicular sciatica—Bilateral sciatica—Etiological diagnosis—Primary sciatica—Gout—Infectious or toxic origin — Influenza — Gonorrhœa — Syphilis—Tubercle—Secondary sciatica—Differential diagnosis—Osteo-arthritis of the hip-joint—Tuberculous disease of the hip-joint—Tuberculous disease of the sacro-iliac joint—Relaxation of the sacro-iliac ligaments—Subgluteal bursitis—Lumbar spondylitis—Lumbar osteo-arthritis—Malignant disease of the femur—Syphilitic periostitis—Thrombosis of femoral vein—Lightning pains of tabes dorsalis—Intermittent claudication—Sciatic pain due to static deformities—Aneurysm of the sciatic artery—Lesions of cauda equina - - - 359–372

CHAPTER XXIX

CRURAL NEURALGIA AND NEURITIS

Etiology—Anterior crural nerve—Gout—Diabetes—Infections—Alcoholism—Osteo-arthritis of the hip—Inflammation of the psoas muscle—Enlargement of the inguinal glands—Disease of the testicle or urethra—Obturator nerve—Obturator hernia—Tuberculous and osteo-arthritic disease of the hip—External cutaneous nerve—Trauma—Influenza—Syphilis—Gonorrhœa—Static deformities of the lower limb Anterior crural neuralgia—Clinical account—External cutaneous neuralgia—Clinical account—Obturator neuralgia—Diagnosis—Anterior crural neuralgia—Obturator neuralgia—External cutaneous neuralgia—General crural neuritis—Clinical account - - 373–377

CHAPTER XXX

BRACHIALGIA

Introductory remarks—Etiology—Primary brachialgia—Sex and age incidence—Gout—"Rheumatic" influences—Infections—Influenza—Gonorrhœa—Trauma—Secondary brachialgia—Increased intrathoracic pressure—Inflammatory or malignant growth in meninges, cord, or vertebral column—Cervical rib—Subacromial bursitis—Malignant growths of the scapula or humerus—Mechanical or static causes—Brachial neuralgia—Clinical account—Mode of onset—Subjective symptoms—Distribution of pain—Character of pain—Objective phenomena—Tender points—Absence of persistent tenderness of nerve trunk—Motor phenomena—Course of the disease—Brachial neuritis—Clinical account—Mode of onset—Subjective symptoms—Distribution and character of pain—Aggravating factors—Objective sensory changes — Paræsthesiæ — Anæsthesia—Motor phenomena—Muscular atrophy—Trophic changes—Hyperidrosis—Subcutaneous œdema—Arthritic changes in phalangeal joints—Course and duration—Secondary brachialgia—Radicular types—Course and duration—Diagnosis—Topographical diagnosis—Brachial fibrositis—Affections of the shoulder-joint—Characteristics of brachial neuralgia—Features of brachial neuritis—Differentiation of primary and secondary brachialgia—Distinction of root type from trunk type of brachialgia—Etiological diagnosis—Differential diagnosis—Occupation myalgias—Affections of the shoulder-joint—Cervical rib - - - 378–388

CHAPTER XXXI

NEURO-FIBROSITIS: GENERAL PROGNOSIS

PAGES

Underlying constitutional state—Nature of the pathological process—Presence or absence of the neuropathic disposition—Age—Occupation—Variations according to the anatomical site of disease—Primary sciatica—Root sciatica—Brachialgia - - - 389-391

CHAPTER XXXII

FIBROSITIS: GENERAL TREATMENT

Localized foci of infection or toxic absorption—Diet—Diet in acute phases—Diet in chronic cases—General considerations—Diet in frankly gouty cases—Diet in excessive intestinal fermentation—Purin-free diet—Beverages—Diet in non-gouty cases—Diet in cases characterized by urinary hypo-acidity—Diet in obese subjects—Clothing—Functions subserved by clothing—Underwear most suitable for "rheumatic" subjects—Considerations in regard to outer layers of clothing—Climate and residence—Ideal climatic conditions—Climate suitable for sedentary persons—Climate suitable for enfeebled persons—Choice of residence—Soil—Aspect of house—Trees—Spa treatment—Radio-active waters—Physical properties of radium—Physiological action of radium emanation — Inhalation — Oral administration — Biological effects—Activation of the body ferments—Antiphlogistic action—Influence on uric acid metabolism—Increased excretion of uric acid—Subjective phenomena in relation to blood-content and excretion of uric acid—Therapeutic action and application—Alimentary disorders of gouty or other origin—Suggested bactericidal power—Comparison of artificial and natural radio-active waters—Massage and exercise—General hydrotherapy—Need for discrimination in selection of measures—Value of subthermal and cold applications—Methods of application—Acute diffuse fibrositis—Measures suitable for subacute stages of articular, muscular, or nerve types—Measures suitable for chronic articular, muscular, or nerve types—Aix and Vichy massage—Vapour baths—Prophylactic measures—Untoward results or complications of hydrotherapy—Indications of beneficial or adverse effects on metabolism—Treatment by hyperæmia—Varieties of hot-air baths—Respective merits—Therapeutic indications—Details of technique—Prophylactic usage—Peat, mud, and fango baths—General drug treatment—Acute generalized fibrositis—Acute localized fibrositis—Arthritic types—Muscular types—Relief of pain in acute types of muscular fibrositis—Neuralgic types—Chronic or recurring forms—Correction of the disorders of digestion—Promotion of hepatic and renal activity—Correction of abnormal fermentative and putrefactive processes—Elimination of toxic products—Drugs empirically administered—Serum and vaccine-therapy—Principles underlying passive and active immunization—Serum-therapy in chronic articular rheumatism—Differential specific diagnosis—Treatment of local foci of infection a necessary preliminary to vaccine-therapy—Vaccine-therapy—Control and spacing of autogenous vaccines—Stock vaccines—Combined serum and vaccine therapy—Summary - - - - - - 392-451

CHAPTER XXXIII

ARTICULAR FIBROSITIS, OR CHRONIC ARTICULAR RHEUMATISM: LOCAL THERAPY

Arthralgic forms—Acute generalized fibrositis—Chronic arthralgia—Osteoperiosteal neuralgia—Periarthritis—Acute types—Rest and fixation—Proper postures—Relief of pain—Hot and cold applications—Analgesic

PAGES

applications — Duration of fixation — Subacute types or stages—General considerations—Relative or absolute fixation—Correction of tendencies to malposition—Hip—Knee—Ankle—Shoulder—Elbow—Wrist—Fingers—Passive exercises—Relief of pain—Dry heat—Moist heat—Passive hyperæmia—Method of application—Analgesic applications—Counter-irritation—Measures to promote absorption—Combined fomentations and stimulating compresses—Liniments—Measures to combat stiffness—Combined stimulating and alternate compresses—Massage—Subacute and chronic types or stages—Special modes of therapy—Local hydrotherapy—Douches—Relief of pain—Relief of stiffness and swelling—Dry massage douche—Wet douches—Local vapour bath—Treatment by hyperæmia—Local mud, peat, fango, and sand baths—Local hot-air and light baths—After-treatment—Electro-therapy—Continuous current—Ionization—Analgesic action — Sclerolytic action — High-frequency currents—Diathermy—Static-wave current—Conclusions—Surgical measures—Acute stages—Subacute and chronic stages — Enlargement of synovial villi—Correction of deformity—Exclusion of bony ankylosis—Differentiation of various forms of fibrous ankylosis—Periarticular bands—Intra-articular bands—Muscular spasm or contracture—Safeguards to be observed before resorting to correction—State of articular surfaces and joint capsule—Relationship and state of bones entering into the articulation—State of the muscles and soft tissues—Methods of rectification—Sudden or forcible means—Cases suitable for gradual rectification — Osteotomy—Excision of joints — Erasion — Arthroplasty—Chronic fibrous rheumatism—Localized articular types—Fascial type—*Rhumatisme chronique fibreux* - - - - - 452-492

CHAPTER XXXIV

MUSCULAR FIBROSITIS: LOCAL THERAPY

Acute types—Relief of pain—Rest and fixation—Thermic applications—Dry heat—Moist heat—Acupuncture—Aquapuncture—Anodyne applications—Pigments—Liniments—Ointments—Medicated plasters—To promote absorption—Rubefacient and counter-irritant applications—Massage—Technique in acute cases or exacerbations—Systematic exercises—Acute brachial fibrositis—Lumbago—Torticollis—Prevention of recurrence and prophylaxis—Local hyperidrosis in lumbago—Torticollis—Cephalalgia—Other prophylactic measures—Chronic or recurring forms of fibrositis—Massage—Preparation and technique—Position of patient—Use of lubricants—Nature of case—Friction—Pétrissage—Tapotement—Vibratory massage—Hydrotherapy—Relief of pain—Relief of stiffness—Massage douche—Hyperæmia—Local hot-air baths—Local vapour baths—Local incandescent-light baths—Local peat and mud baths—Electro-therapy—Galvanism—Faradism—Ionization—High frequency—Special modes of treatment—Injection of chromic acid—Fibrolysin—Excision of nodules - - 493-511

CHAPTER XXXV

NEURO-FIBROSITIS: LOCAL THERAPY

Sciatica—Acute stages—Local measures—Leeches—Dry cupping—Counter-irritants—Rest and fixation—Splints—Plaster of Paris bandages—Medicated plasters—Fixation by extension—Thermic and cold applications — Anodyne applications — Liniments — Ointments — Pigments — Medicated plasters — Hypodermic injections — Morphia — Morphia and atropine—Cocaine—Subacute stages—Massage and passive movements—Electrical methods—Galvanism—Ionization—Dia-

PAGE

thermy—Counter-irritation—Chronic stages or types—Massage and passive movements—Hydrotherapy—Immersion baths combined with undercurrent douches—Scotch douche—Vapour douche—Filiform douche—Cold massage douche—Hyperæmia—Packs of hot sand, peat, mud, and fango—Local hot-air or electric-light baths—Electrical treatment — Hydro-electric bath — Ionization — Static electricity—Faradic brush—Local intensive irradiation followed by static electrical treatment—Subcutaneous injections—Osmic acid—Methylene blue—Deep or intraneural injections—Normal saline solution—Lange's method—Wilfrid Harris's method—Localization of site of injection of nerve—Subarachnoid and epidural injections—Method of technique—Retrorectal injections—Additional methods of relieving pain—Cauterization—Digital compression—X rays and radium emanations—Surgical treatment—Acupuncture—Bloodless nerve stretching—Open operation—Exposure of nerve trunk, with subsequent division of adhesions—Neurinsarcoclesis—Ablation of varicose vessels—Neurotomy—Local prophylactic measures—Crural neuralgia and neuritis—Acute stages—Rest—Thermal and anodyne applications—Ionization—Diathermy—Subacute and chronic stages—Massage—Passive movements—Hydrotherapy—Counter-irritants—Saline injections—Surgical intervention—Brachialgia—Acute stages—Local measures—Leeches—Dry cupping—Rest—External applications—Icebags—Fomentations—Local hot-air or radiant-heat baths—Revulsive compresses—Sedative and analgesic applications—Liniments—Ointments—Pigments—Electrical methods—Galvanism—Ionization—Hypodermic injections—Morphia—Cocaine—Alcohol—Subacute and chronic stages—Relief of pain—Counter-irritation—Flying blisters—Actual cautery—Faradic brush—Massage and passive movements—Hydrotherapy—Surgical intervention - - - - - - - 512-536

TRAUMATIC FIBROSITIS

CHAPTER XXXVI

SUBACUTE RHEUMATIC SYNOVITIS

Etiology—Trauma—Features suggestive of such an origin—Morbid anatomy—Clinical account—Mode of onset—Shoulder-joint—Subjective symptoms and objective phenomena—Knee-joint—Subjective symptoms and objective phenomena—Diagnosis—Subacute synovitis of shoulder—Differential diagnosis—Periarticular adhesions—Osteo-arthritis of shoulder—Tuberculous disease of shoulder—Diagnosis—Subacute synovitis of knee—Differential diagnosis—Traumatic lesions—Displaced semilunar cartilage—Loose bodies—Nipped fringes—Lipoma arborescens—Hæmophilic arthritis—Infective hydrarthrosis—Charcot's disease—Perisynovial and peribursal gummata—Primary synovial tuberculosis—Chronic osteitis—New growths of articular ends of bone—Treatment—General remarks—Local measures—Rest and fixation—Relief of pain—Icebags—Fomentations or poultices—Treatment of effusion—Aspiration with subsequent compression—Duration of fixation—Symptoms pointing to subsidence of morbid process—Massage and passive movements—Cases characterized by thickening—Counter-irritation—Blisters—Galvanic cautery—Alternate douches—Local hot-air or electric-light baths—Massage and passive movements—Treatment of adhesions—Forcible rupture—Technique—After-treatment—Gradual means—Exercises by weights and pulleys or Zander's appliances, combined with hot douches, local vapour, hot air, or electric-light baths - - - - - - - 537-552

CHAPTER XXXVII

"RHEUMATIC" BURSITIS—BURSAL AFFECTIONS OF UPPER LIMB—BURSAL AFFECTIONS OF LOWER LIMB

PAGES

Historical retrospect—Bursal affections of upper limb—Subacromial bursitis—Anatomical relationships—Mechanical functions—Etiology—Primary types—Trauma—Infections—Post-scarlatinal rheumatism—Gonorrhœa—Tubercle—Acute tonsillitis or pharyngitis—Diathetic causes—Acute rheumatism—Gout—Secondary types—Extension of disease from shoulder-joint—Gonorrhœa—Tubercle—Osteo-arthritis—Sequel of fracture or dislocation of the upper end of humerus—Extension of deltoid fibrositis—Clinical account—Mode of onset—Acute types—Subjective symptoms—Pain, local and referred—Local signs—Tenderness to pressure—Limitation of mobility—Effusion into sac—Course of disease—Chronic types—Clinical signs—Duration—Subcoracoid bursitis—Etiology—Trauma—Strains of coracobrachialis muscle—Mechanical factors—Position of shoulder—Shape of, and angle presented by, coracoid process—Clinical account—Mode of onset—Subjective symptoms—Pain, local and referred—Limitation of mobility—Local signs—Diagnosis—Subacromial bursitis—Subcoracoid bursitis—Differential diagnosis—Synovitis of shoulder—Torn shoulder capsule—Circumflex paralysis—Secondary bursitis—Osteo-arthritis of shoulder—Fracture of great tuberosity—Bursal affections of lower limb—Subgluteal bursitis—Symptoms—Local signs—Ilio-psoatic bursitis—Patellar bursitis—Post-calcaneal bursitis—Diagnosis—Differential diagnosis—Treatment of bursitis of the upper limb—Subacromial type—General considerations—Local treatment—Relief of pain—Acute stages—Rest—Fixation of limb in position of abduction—Dry heat—Fomentations—Intensive irradiation—Passive movements—Massage—Restitution of shoulder to normal position—Treatment of adhesions—Gradual stretching—Forcible rupture under anæsthesia—After-treatment—Incision of bursa with division of adhesions—Excision of subdeltoid portion—Subcoracoid type—Acute stages—Rest—Restitution of shoulder to normal position—Treatment of adhesions—Forcible rupture under anæsthesia—Order in which movements should be performed—After-treatment—Treatment of bursitis of lower limb—Subgluteal bursitis—Acute stages—Rest—Hot fomentations combined with analgesic remedies—Chronic stages—Massage—Inunction of iodine preparations—Excision of bursa—Ilio-psoatic bursitis—Acute stages—Rest—Hot fomentations combined with analgesic remedies—Chronic stages—Massage—Inunction of iodine preparations—Prepatellar bursitis—Rest—Bandaging or strapping—Chronic stages—Incision—Excision of bursa—Post-calcaneal bursitis—Rest—Local applications—Fixation of limb on splint - 553-577

CHAPTER XXXVIII

TRAUMATIC MUSCULAR FIBROSITIS

Strain or rupture of muscles—General considerations—Muscles of upper extremity—Scapulo-humeral group—Etiology—Clinical account—Elbow muscles—Etiology—Clinical account—Views as to the nature of the lesion—Forearm muscles—Etiology—Muscles of the lower extremity—Glutei—Etiology—Clinical account—Adductor muscles—Etiology—Clinical account—Quadriceps extensor—Gastrocnemius—Muscles of trunk—Abdominal muscles—Treatment—Lesions of the upper extremity—Tennis elbow—Massage and strapping—Lesions of the lower extremity—Tennis leg—Massage and strapping—Rider's sprain—Massage and strapping—Exercise—Walking—Riding—Lesions of gluteal and quadriceps muscles—Massage, strapping, and passive movements—Lesions of abdominal muscles—Massage and strapping—Surgical intervention—Suture of divided ends in complete rupture - 578–587

CHAPTER XXXIX

TRAUMATIC LUMBAGO

PAGES

Introductory remarks—Etiology—Extrinsic causes—Indirect injury—Upper end of spinal column—Lower end of spinal column—Direct injury—Intrinsic causes—Anatomical lesions—Muscles—Ligaments—Intervertebral joints—Osseous lesions—Fracture of the transverse processes—Fracture of the fifth lumbar vertebra—Clinical account—Strain or rupture of muscles—Mode of onset—Subjective symptoms—Site of pain—Muscular disabilities—Objective signs—Tenderness to pressure—Ecchymosis, swelling, and effusion—Wasting and flabbiness of lumbar muscles—Course of disease—Traumatic lumbago due to ligamentary, articular, or osseous lesions—Injury to spinal ligaments—Anterior group—Posterior group—Lesions of the lateral vertebral articulations—Injury to sacro-iliac joints—Fracture of transverse processes — Objective phenomena — Static abnormalities — Lumbar scoliosis—Diminution or increase of physiological lordosis—Disorders of mobility—Abnormalities of forward flexion—Abnormalities of lateral flexion—Course of disease—Skiagraphy—Diagnosis—Muscular or tendinous lesions—Ligamentary lesions—Osseous lesions—Differential diagnosis—Fracture dislocation of spine—Simple acute lumbago—Simple chronic lumbago—Lumbar spondylitis—Atrophic type—Hypertrophic type—Elongation of the fifth lumbar transverse process—Treatment—Strain or rupture of muscles—Examples of recent date—Relief of pain—Rest—Fomentations—Anodyne applications—Firm strapping—Massage and systematic exercises—Cases of long standing—Relief of pain—Counter-irritation—Massage—Exercises—Hydrotherapy—Atrophy—Corrective gymnastics with massage and exercise—Hydrotherapy—Adhesions—Forcible rupture under anæsthesia—Ligamentary and osseous lesions—Strain or rupture of spinal ligaments—Rest in recumbent position—Relief of pain—Local anodyne applications—Massage—Hot douches—Actual rupture—Plaster jacket followed by recumbency—Massage—Strains of intervertebral joints—Fixation of spine - - - 588-611

CHAPTER XL

MALINGERING IN RELATION TO TRAUMATIC LUMBAGO

Introductory remarks—Exclusion of real disease—Detection of the imposture—Investigation of case—Study of the past history of the individual—Analysis of the circumstances of alleged casualty—Physical examination—Presence or absence of static disproportions—Character of the pain—Location of the pain—Objective tenderness—Atrophy and flabbiness of muscles—Muscular disabilities—Abnormalities of flexion - - - - - - - - 612-621

STATIC DISORDERS

CHAPTER XLI

CHRONIC VILLOUS SYNOVITIS

Introduction—Etiology—Rheumatoid arthritis—Infective arthritis—Trauma—Static disturbance in the lower limb—Flat-foot—Inequality in the length of the limbs—Mechanism of lower extremity, and its bear-

PAGES

ing on the pathogeny of villous synovitis—Static interdependence of component parts of lower limb—*Modus operandi* of flat-foot in causing villous synovitis—Production of villous hypertrophy—Haggenhorn and Schuller's researches—Sokoloff's observations—Analogies drawn from lower animals—Morbid anatomy—Macroscopical appearances—Microscopical findings—First stage—Hypertrophy of villi and fixed connective-tissue cells—Second stage—Degenerative changes - 623–631

CHAPTER XLII

VILLOUS SYNOVITIS OF KNEE

Clinical account—Mode of onset—Subjective symptoms—Stiffness—Site and character of pain—Pseudo-locking—Objective phenomena—Limitation of movement most marked in extremes of extension and flexion—Detection of presence of enlarged villi—Signs of incarceration of villi—Recurring synovial effusion—Course of disease—Influence of the following factors: Flat-foot—Obesity—Varicose veins. Undue laxity of ligaments following synovial effusion—Skiagraphy—Articular incongruence of knee-joint—Want of coaptation of astragalo-scaphoid surfaces and also of tarsal joints—Diagnosis—Villous synovitis—Differential diagnosis—Osteo-arthritis of the knees—Rheumatoid or atrophic arthritis—Bilateral infective hydrarthrosis—Intermittent hydrarthrosis—Perisynovial and peribursal gummata - - 632–638

CHAPTER XLIII

VILLOUS SYNOVITIS OF HIP

Clinical account—Subjective symptoms—Site of pain—Articular pain—Local tenderness—Referred pains—Paths of distribution—Associated lumbar pain — Differentiation from that accompanying sciatica—Alterations in gait and attitude—Limitation of mobility—Flexion contracture—Restriction of inward rotation and abduction—Summary of clinical features—Terminal stages—Relationship of villous synovitis to osteo-arthritis—Diagnosis—Etiological—Local symptoms and signs of villous synovitis of hip—Differential diagnosis—Tuberculous coxitis—Osteo-arthritis of hip—Primary sciatica—Prognosis of chronic villous synovitis—Recognition and treatment of static deformities in the lower limbs—Presence of aggravating factors—Previous duration of disease - - - - - - - - - 639–648

CHAPTER XLIV

VILLOUS SYNOVITIS: GENERAL TREATMENT

Correction of static deformities—Characteristics of flexible and rigid flat-foot—Flexible flat-foot—Early or slight cases—Proper footgear—Exercises—Resistance movements—Severe cases—Exercises—Boot with oblique sole—Efficient foot-plates—Restoration of natural powers of arch—Rigid flat-foot—Surgical measures—Additional modes of treatment—Massage—Local hydrotherapy—Hyperæmia—Ionization—Obesity—Diet necessary for reduction of weight—Hydrotherapy—Electric-light baths—Loss of muscular and ligamentary tone—Revision of general habits — Hydrotherapy, massage, and suitable exercises—Villous synovitis of knee—Local treatment—Mechanical supports—Firm bandaging—Strapping—Knee-cage—Massage—Derivative in character—Cases complicated by varicose veins—Hyperæmia and hydrotherapy—Surgical measures—Arthrotomy—Removal of fringes

PAGES
—Villous arthritis of hip—Local treatment—Mechanical supports—Firm bandaging in a spica fashion—Leather ensheathing apparatus—Massage, active hyperæmia, and exercises - - - 649–655

CHAPTER XLV

SACRO-ILIAC RELAXATION

Anatomical and mechanical considerations—Etiology—Sex—Physiological—Pregnancy—Menstruation—Pathological—Traumatic types—Static types—Static foot errors—Asymmetry of the lower extremities—Mal-united fracture—Alteration in the normal relationship of spinal curves—Exaggeration of physiological lordosis—Dorsal kyphosis—Obesity—Straight-fronted corsets—Diminution of physiological lordosis—Prolonged anæsthesia—Extended illness—Rachitic and other abnormal types of pelvis—Clinical account—Nerve relationships of sacro-iliac joint—Mode of onset—Acute types—Chronic types—Subjective symptoms—Local pain—Site—Aggravating factors—Referred pains—Sciatic nerve—Inferior pudendal nerve—Accessory obturator nerve—Ilio-hypogastric and ilio-inguinal nerves—Objective phenomena—Severe types—Alterations in gait and attitude—Subluxation of upper part of sacrum—Disorders of mobility—Mild types—Postural abnormalities—Disorders of mobility—Course of disease—Terminal changes—Diagnosis—Sacro-iliac relaxation—Subjective symptoms—Objective signs — Skiagraphy — Differential diagnosis — Acute lumbago—Chronic lumbago—Sciatica—Hip disease—Treatment—Principles of treatment—Acute types—Rest and fixation—Reduction of subluxation—Retention of bones in corrected position—Subacute or chronic types—General remarks—Correction of flat-feet—Reduction of obesity—Restoration of muscular tone—Local treatment—During exacerbations—Rest and fixation—Subacute or chronic stages—Severe types—Correction where present of flattening of lumbar spine—Subsequent retention by plaster of Paris—Mild types—Webbing belt—Woven elastic trunks of Osgood—Restoration of muscular and ligamentary tone—Massage and exercises—Physical therapy—Local hot-air baths—Radiant-heat baths—Ionization—Vibratory massage—Local douching - - - - - - - 656–676

INDEX - - - - - - - - 677–693

LIST OF ILLUSTRATIONS

FIG. TO FACE PAGE

1. Streptococcus from a case of rheumatism, showing long chains and green pigment. Streak from a sediment of a twenty-four hours' ascites-dextrose-bouillon culture; capsular stain - - - 36
2. Strain of *Streptococcus rheumaticus*, showing slight hæmolysis on blood agar, which gave rise to myositis in animal experiments. Streak from a blood agar stab culture; capsular stain - - - 36
3. The same strain as in Fig. 2 after its transformation into a pneumococcus. Streak from a blood agar stab culture - - - 36
4. Experimental rheumatic myositis in a dog. Microphotograph of longitudinal section of lesion in muscle two weeks after injection of a streptococcus, showing affinity for the muscles (× 230) - - 50
5. Rheumatic myositis in man. Microphotograph of human (biceps) muscle, showing marked degeneration of muscular fibres, leucocytic infiltration, and hæmorrhage. Frozen section. Hæmatoxylin and eosin (× 230) - - - - - - - 50
6. Section of inflamed perimysium, forming a painful swelling on the muscle (× 140). It consists of proliferated and œdematous fibrous tissue, with an amorphous matrix, and at places this penetrated between the muscle fibres. In the section it is detached from the underlying muscle fibres - - - - - - 98
7. Portion of same (× 550) - - - - - - - 98
8. Section of fibrous nodule lying immediately under the skin and continuous with it (× 75). It had been massaged for some time - 99
9. A strand of fibrous tissue lying in the subcutaneous fat, and spreading into it (× 75). This was painful on pressure - - - 99
10. Section of dense subcutaneous nodule spreading into the fatty tissue (× 75) - - - - - - - - - 100
11. Section of a nodule which lay in the fascia (× 140). It had been massaged, but instead of dispersing became very hard and fibrous - 100
12. Section of portion of a nodule showing periarteritis and endarteritis and numerous bloodvessels (× 75). The nodule had been massaged for some time - - - - - - 101
13. Section of recent periosteal nodule (× 140). It shows the increased and œdematous fibrous tissue - - - - - 101
14. Chart showing irregular or septic course of temperature in a case of infective arthritis - - - - - - - 118
15. Infective arthritis of left knee, with marked atrophy of thigh muscles of same limb - - - - - - - - 120

FIG. TO FACE PAGE

16. Hand of same patient, showing fusiform enlargement of mid-pharyngeal joints of index and middle fingers - - - - - - 120

17. Palmar fibrositis, with Dupuytren's contracture of little finger, in a person the subject of gout - - - - - - 126

18, 19. Deformity of fingers following chronic rheumatism. Subject, girl of sixteen. Condition developed out of previous attack of acute articular rheumatism - - - - - - 130

20. Multiple arthropathies of knee and right hand (small joints) in a woman the subject of syringomyelia - - - - 138

21. Infective arthritis in child eleven years old. Transparency of ends of bones and no bony enlargement - - - - - 142

22. Tabes dorsalis, with arthropathy of left knee - - - - 142

23. Rheumatoid or atrophic arthritis. Atrophy of cartilage of metacarpo-phalangeal joints of index and middle fingers. Destruction of bony tissue in heads of metacarpal bones. Also shows atrophy of cartilage in mid-phalangeal joint of little, ring, and middle fingers - - 144

24. Hand showing osteo-arthritic changes - - - - - - 146

25. Chronic gout, showing large swelling in soft tissues on ulnar side of hand, due to uratic deposits - - - - - - 148

26. Fasciculi of muscular fibres in transverse section. Some of the fasciculi have fallen out of the section. In the perimysium of the fasciculi numerous capillary bloodvessels are seen in transverse section. (From a transverse section of the human sartorius muscle, hardened in picric acid solution and alcohol.) (Toldt's Atlas) - - - 188

27. Diagram to show muscles and nerves concerned in Sherrington's experiment on the reciprocal innervation of antagonistic muscles - 188

28. A neuro-muscular spindle of the cat. (Ruffini) - - - - 188

29. Acute rheumatic muscular torticollis. Clavicular bundle of trapezius on right side chiefly affected - - - - - - 202

30. Chronic cervical fibrositis, implicating not only the muscles, but the facial layers of the nuchal region, with resultant marked thickening of the structures in this region - - - - - 206

31. Skiagram of case of spondylitis deformans. The plate shows the resulting fusion of the bodies of cervical vertebræ - - - 210

32. The above diagram shows the sites at which nodules are most commonly found in chronic cervical fibrositis and cephalalgia rheumatism 210

33. The muscles of the neck and back being especially liable to fibrositis, this plate has been here inserted to show the anatomical disposition of the muscles most commonly affected in acute and chronic torticollis - - - - - - - - 212

34. Deltoid muscle of right side, dorso-external aspect, showing its relations to the adjoining muscles of the shoulder and of the upper arm. (Toldt's Atlas) - - - - - - - - 226

35. Chronic brachial fibrositis. The diagram illustrates the sites at which nodules are most commonly found in the upper extremity - - 226

36. Skiagram of shoulder-joint, showing osteo-arthritic changes, a remote sequel to direct injury - - - - - - 228

FIG. TO FACE PAGE
37. The stratification of the muscles of the trunk and of their associated fasciæ displayed in a horizontal section of the right half of the body-wall. The connections between the anterior aponeuroses of the wide muscles of the abdomen and the sheath of the rectus are shown. (Toldt's Atlas) - - - - - - 236
38. Third layer of the muscles of the back (long muscles of the back). They consist of the ilio-costalis (sacro-lumbalis) and the longissimus dorsi, with their prolongations upwards—accessorius, spinalis, and splenius muscles. (Toldt's Atlas) - - - - - 236
39. Diagram to show common sites of muscle indurations in ilio-costalis and tendon nodules in the attachments of the dorsal muscles to the iliac crest and sacrum - - - - - - 244
40. This plate shows the arrangement of patient most suitable for the palpation of tendon nodules in chronic lumbago - - - 246
41. Skiagram of a case of renal calculus - - - - - 246
42. Spondylose rhizomelique, or atrophic spondylitis - - - 248
43. Skiagram of a case of symmetrical osteo-arthritis of sacro-iliac joint - 250
44. Skiagram of lumbar caries - - - - - - 252
45. Skiagram of a case of lumbar spondylitis (atrophic type). Shows partial fusion of the individual segments - - - - 252
46. Skiagram of osteo-arthritis of lumbar spine, showing lipping and alteration of intervertebral spaces - - - - - 252
47. This diagram indicates the common site of nodules in the various types of abdominal fibrositis - - - - - - 268
48. Arrangement of patient most suitable for palpation of nodules in gastrocnemius - - - - - - - 274
49. In this are shown the thoracic and abdominal muscles: on the right side the most superficial layer, and on the left side the layer immediately beneath this. (Toldt's Atlas) - - - - 274
50. Second layer of the external muscles of the hip displayed by the division of the gluteus maximus muscle and the posterior portion of the fascia lata. Note particularly the position of the gluteus medius, the muscle most commonly attacked by fibrositis. (Toldt's Atlas) - 274
51. This diagram illustrates the most common sites for nodules in fibrositis of the ilio-tibial band - - - - - - 278
52. Deep fascia of the thigh, or fascia lata, seen from the outer side, with the thickened band of fascia known as the ilio-tibial band, a favourite site for fibrositis. (Toldt's Atlas) - - - - - 278
53. Diagram to illustrate the most common sites for nodules in gluteal fibrositis. Frequently also there are nodules lying close above the iliac crest, in the attachments of the quadratus lumborum thereto - 280
54. This diagram illustrates the most common sites for nodules in hamstrings and gastrocnemius - - - - - - 280
55. Skiagram showing calcification of the tendo-Achillis at its insertion into the os calcis - - - - - - - 286
56. Skiagram of painful heel. Note bony spur on inferior surface of os calcis - - - - - - - - - 286

FIG. TO FACE PAGE

57. The sacral plexus, the pudic plexus, and the coccygeal plexus, as seen in the right half of a male pelvis divided by a median sagittal section. (Toldt's Atlas) - - - - - - 308

58. The course of the great sciatic nerve from the gluteal region down the back of the thigh, and its division into the internal popliteal and the external popliteal nerves. (Toldt's Atlas) - - - - 310

59. Location of the "tender points" found in sciatica - - - 320

60. Method of eliciting Lasègue's sciatic phenomenon - - - 322

61. Shaded areas indicate region in which anæsthetic patches are found in sciatic neuritis of trunk type - - - - - 326

62. The cutaneous areas of the nerves of the lower extremity, anterior and posterior surfaces. (Toldt's Atlas) - - - - - 328

63. The cutaneous areas of the brachial nerves of the anterior and posterior surfaces of the upper extremity - - - - - 328

64. Method of eliciting tendo-Achillis jerk - - - - - 330

65. Subcutaneous adiposity - - - - - - 332

66. Scoliose alternante avec lombo-sciatique droite. (Henry Meige.) Sur le même cliché on a fait deux poses successives pour les deux positions du corps. Le bassin et les membres inférieurs n'ont subi qu'un déplacement insignificant - - - - - 334

67. Neuralgia of left sciatic trunk - - - - - - 336

68. Detection of crossed scoliosis - - - - - - 338

69. Right-sided sciatica (heterologous scoliosis). Concavity of dorso-lumbar curvature faces unaffected or healthy side. Trunk is tilted to unaffected side so markedly that the arm hangs away from unaffected side, while on opposite side arm is closely applied - 338

70. Heterologous scoliosis - - - - - - - 338

71. Left sciatic neuritis - - - - - - - 342

72. Left sciatic neuritis - - - - - - - 342

73. The distribution of the external popliteal nerve, its branches to the peroneus longus and brevis muscles, and its cutaneous branch to the dorsum of the foot—the musculo-cutaneous nerve. (Toldt's Atlas) - - - - - - - - 344

74. Shaded areas indicate the region in which objective sensory changes were found by the authors in radicular sciatica - - - 354

75. These show the distribution of the segmental areas from the third cervical to the fourth sacral zone. (Head) - - - - 356

76. Areas, back and side. (Head) - - - - - - 356

77. Right-sided sciatica of radicular type - - - - - 358

78. Osteo-arthritis of right hip-joint, showing atrophy of glutei on right side, also scoliosis - - - - - - - - 364

79. Skiagram of osteo-arthritis of hip. It shows large exostoses projecting from superior rim of acetabulum - - - - 366

80. Skiagram of right ankle-joint, showing calcification of external plantar artery - - - - - - - 370

81. Palmar atrophy in a case of cervical rib - - 384

FIG. TO FACE PAGE

82. Skiagram of cervical region as in preceding figure, taken by Dr. Bowker, showing a rudimentary rib on either side - - - 384
83. Skiagram showing complete cervical rib on one side and enlarged seventh cervical transverse process on the other - - - 388
84. Radium inhalatorium in use at Bath, showing niton spray - - 394
85. Circular needle douche - - - - - - - 420
86. Cabinet vapour bath - - - - - - - 424
87. Vichy massage douche - - - - - - 426
88. Greville bath. Whole body exposure - - - - - 426
89. Incandescent-light bath - - - - - - 428
90. Dowsing or radiant-heat bath - - - - - - 430
91. Malposition of joints. Both wrists are ankylosed in palmar flexion - 452
92. Malposition of joints. Showing flexion-contracture of knee and hyperextension of ankle - - - - - - 454
93. These photographs show the postures in which arthritis of the wrist, shoulder, elbow, knee, and ankle, ought to be fixed to avoid ankylosis in unfavourable positions - - - - - 456
94. Schnee four-cell bath - - - - - - - 478
95. High-frequency couch - - - - - - - 480
96. Vertical section of left knee-joint, showing extreme degree of fibrous ankylosis. (U.C.H. Museum) - - - - - 484
97. Skiagram of case referred to in text. The condition was one of atrophic arthritis. The wrist was fixed in the position shown - - 486
98. Plates illustrative of types of movement practised in massage. *A*, pétrissage; *B*, tapotement; *C*, effleurage; *D*, friction with rolling - 506
99. Apparatus for vibratory massage - - - - - 508
100. Skiagram of double hallux valgus. Note outward displacement of great toes - - - - - - - - 546
101. Loose body, nearly four centimetres long, removed from a knee-joint, and composed of coarse fibrous tissue, in which a few groups of fat-cells were discernible microscopically. (U.C.H. Museum) - - 546
102. Skiagram of sarcoma of femur - - - - - 548
103. Zander's appliance for movement of shoulder - - - - 552
104. Arrangement of the muscles adjoining the right shoulder-joint and in the proximal portion of the upper arm as seen from the outer side after the removal of the greater part of the deltoid muscle. Subdeltoid bursa, and subcutaneous bursa of acromion. (Toldt's Atlas) - - - - - - - - 554
105. Fig. 1 is a diagram from a frozen section. Note origin of deltoid from edge of acromion; also subdeltoid bursa with its roof formed of under-surface of acromion and fascia beneath upper portion of deltoid. Its base is formed by greater tuberosity and the tendon of supraspinatus. Fig. 2 illustrates the state which would be found in complete abduction, the tuberosity having passed under the acromion and the point *B* having passed the point *A*. Figs. 3 and 4.—A diagrammatic representation of a horizontal section

FIG. TO FACE PAGE

through the head of the humerus to indicate the lateral extent of the bursa and the necessity for its existence to allow greater tuberosity to rotate beneath deltoid - - - - - 554

106. Gouty inflammation of the bursa over the olecranon - - - 556

107. The position of the left arm in *A* indicates extent of painless movement in subacromial bursitis. The further elevation of the arm to the position indicated in *B* is attended by extreme pain, which, on still higher elevation, tends to progressively decrease until the subject finds complete ease in the pose assumed in *C* - - 560

108. Showing points of maximum sensitiveness in subcoracoid and subacromial bursitis - - - - - - - - 566

109. Showing abduction splint in position, the patient standing. It is held by a figure-of-eight bandage crossing behind the shoulder and a belt about the hips. The arm is at rest - - - - - 574

110. Tuberculous caries of lumbar spine - - - - - - 574

111. Skiagram of painful and stiff shoulder, wrongly attributed to fibrous ankylosis. Forcible manipulation resulted in fracture. The true condition was one of traumatic osteo-arthritis - - - 574

112. Normal anteflexion - - - - - - - 600

113. Normal retroflexion of spine - - - - - - 600

114. Normal lateral flexion. Observe creases in loin angle - - - 600

115. Traumatic lumbago. Shows limitation of range of anteflexion - 602

116. Traumatic lumbago. Limitation of backward flexion - - 602

117. Traumatic lumbago - - - - - - - 602

118. Lumbar spondylitis. Note persistence of lordotic curve on forward flexion - - - - - - - - 604

119. Skiagram of the lumbar spine and pelvis of a man who had suffered from lumbar and sciatic pain for over twenty years. The sciatica proved intractable to all forms of treatment, surgical and otherwise - - - - - - 608

120. Forward flexion of spine, showing automatic backward projection of buttocks and extension of ankles - - - - - 620

121. Diving position assumed by malingerer in cases of traumatic lumbago 620

122. Knee-joint, showing hypertrophy of synovial villi. (R.C.S. Museum) - - - - - - - - 634

123. Skiagram of osteo-arthritis of knee, showing lipping of patella and anterior part of articular surface of tibia, with an osteophyte behind femoral condyle (? calcified fringe) - - - - 634

124. Skiagram of osteo-arthritis of knee, showing marked lipping of outer margin of articular surface of tibia and absorption of external articular fibro-cartilage, the surfaces of external condyle of femur and tibial tuberosity being close together - - - - 636

125. Early osteo-arthritis of right hip, showing flexion-contracture of hip-joint and lordosis - - - - - - - 642

126. Flat-feet, pronated and abducted - - - - - 650

127. Skiagram of marked flat-foot with small osteophytes at superior articulations of tarsal bones - - - - - - 656

FIG. TO FACE PAGE
128. Normal pelvis. (U.C.H. Anat. Museum) - - - - 656
129. Exaggeration of normal lumbar curve in sacro-iliac strain - - 660
130. Obliteration of normal lumbar curve in sacro-iliac strain - - 660
131. Relaxation of left sacro-iliac joint. Note list of trunk to right side - 666
132. Relaxation of left sacro-iliac joint - - - - - 666
133. Relaxation of left sacro-iliac joint - - - - - 668
134. Relaxation of left sacro-iliac joint - - - - - 668
135. Pelvis and last two lumbar vertebræ, showing osteo-arthritic changes in both sacro-iliac synchondroses, acetabula, and articular processes of lumbar segments. (U.C.H. Museum) - - - 674
136. Osgood's elastic hose - - - - - - - 674

LIST OF PLATES

1. Infective arthritis: local symptoms and pneumonia - - - 122
2. Palmar fibrositis, or Dupuytren's contraction: chronic fibrous rheumatism - - - - - - - - 128
3. Rheumatoid or atrophic arthritis: Primary stage - - - 134
4. Rheumatoid or atrophic arthritis: Terminal stage - - - 136
5. Osteo-arthritis of hand - - - - - - - 138
6. Gouty arthritis - - - - - - - - 140

ERRATA.

Page XXXV. Plate I. "Infective arthritis: local symptoms and pneumonia" *should read* "Infective arthritis: local symptoms and phenomena."

Page 226, line 6 from below, the sentence "The explanation is probably . . . pain and stiffness," *should be read before* "Women engaged in laundry work . . .", page 227, line 6 from above.

FIBROSITIS

CHAPTER I

INTRODUCTION AND HISTORICAL RETROSPECT

It has ever been advantageous to take from time to time a retrospect of the progress made in the acquisition of knowledge—to pause, as it were, on some eminence gained, and to contemplate at once from this vantage-ground the steps successively attained, and the vast field which lies yet untrodden before us.

Especially instructive is such a review in the case of a disease like "rheumatism," the history of which reflects the impress of the several doctrines which ever and anon dominated the minds of physicians during the darker periods of the history of medicine.

In truth, the word "rheumatism" has in its chequered course played many parts, and the wonder is that the term—despite all the varied interpretations thrust upon it—should have survived to these latter days, surely a striking tribute to the tyranny of words, and what Hazlitt termed "the damning stamp of custom."

Thus, by both ancient and medieval physicians the word was used more in accordance with its etymological sense, the two terms "rheumatism" and "reumes" being indifferently enlisted to denote all those diseases which were attributed by them to the defluxion of an acrid humour upon some one part or other of the body. Subject to this interpretation, these nosological synonyms continually appear throughout the writings of Hippocrates, Galen, Paulus Ægineta, Alexander of Tralles, and others.

As to the source of these peccant humours, the old Greek physicians assumed it to be located in the brain, which organ their fanciful pathology had invested with all the functions and capabilities of an absorbent and secreting gland. However, as with the growth of knowledge the brain came to be recognized as the central organ of the nervous system, this grotesque conception of its glandular nature was ousted by the humoralistic doctrine.

Under its ægis the word "rheum" gradually became restricted in its usage to affections of the mucous surfaces, while at the same time the term " rheumatism " came to indicate a constitutional morbid state characterized by a medley of distempers, reputed to originate from the circulation within the system of some *materies peccans*, or acrid humour, as they preferred to term it. During the Middle Ages, however, the humoralistic views emanating from the Græco-Arabian school gradually fell into disrepute, and with their decline " the flux of humours which the Greeks named ' rheumatism ' " lost its old constitutional significance. We see, therefore, that to the sixteenth-century physician and his forebears the term " rheumatism " or " reumes," as their early English confrères termed it, was, and had been for ages, a synonym for defluxions, humours, and catarrhs of all sorts.

Accordingly, we may search in vain in their writings for the description of any clinical entity corresponding to the joint affections now grouped under this term.

But, in justice to the ancient Greek and Roman physicians, it must be remembered that under the vague designations " arthritis " and " articulorum passio " they have handed down to posterity the clinical description of a joint affection in the varied symptomatology of which we may sometimes descry the features of gout, sometimes those of rheumatism, albeit they themselves had not hitherto effected their differentiation.

Process of Differentiation.

Despite the fact, however, that the physicians of antiquity failed to discriminate between gout and rheumatism, yet from certain vivid clinical pictures portrayed, more particularly in the treatises of Hippocrates and Ætius, it seems clear that the Greek physicians were familiar with an acute rheumatic inflammation extensively implicating the joints.

Nevertheless, their comparative reticence on this point led the illustrious Sydenham, likewise Hecker and Leupoldt, to assume that articular rheumatism was a modern disease, and unknown among ancient peoples.

Identification of Acute Rheumatism.—Truly may it be said that " science moves but slowly, creeping on from point to point," for it was not until the middle of the seventeenth century that Ballonius, dissociating the term " rheumatism " from its primitive interpretation, differentiated it from acute gout, and restricted its usage to the particular group of symptoms we now call " acute articular rheumatism " (1642).

In the same century Sydenham, in his " Classical Observations," materially clarified the clinical confusion, indicating even yet more clearly the essential differences between gout and rheumatism, assigning to the former the name "podagra."

Differentiation of Acute, Chronic, and Muscular Rheumatism.—It was reserved for the genius of Cullen to achieve a still greater advance in differential diagnosis, lucidly discriminating as he did acute from chronic articular rheumatism, and the articular types from simple muscular rheumatism.

This eminent physician strenuously combated the current humoral views of its pathology, attributing the genesis of all forms of rheumatism to "chill" rather than to what was known in those days as a "rheumatic acrimony."

While Cullen undoubtedly threw a flood of light upon the clinical aspect of these various affections, it must be admitted that, from the point of view of their etiology, the undue prominence which he assigned to "chill" as a cause to a large extent counteracted his endeavour to discriminate clinically these "rheumatic conditions."

Chill wrongly regarded as the Sole Cause of Rheumatism.—From time immemorial this factor had loomed large in lay and professional minds as a cause of disease, and Cullen's dictum—gravid with authority—chimed in so well with preconceived ideas that the terms "rheumatism" and "chill" became almost synonymous.

The words of Shakespeare, to wit, abound with allusions to its malign influence in begetting a variety of rheumatic distempers. Thus, the gentle Portia, in wifely solicitude for her spouse's health, remonstrates:

> "Is Brutus sick?
> And will he steal out of his wholesome bed,
> To dare the vile contagion of the night?
> And tempt the rheumy and unpurged air,
> To add unto his sickness?"
> *Julius Cæsar,* Act II., Scene i.

Prejudice and authority having thus joined hands, a cloud of witnesses arose, who claimed a rheumatic kinship for a host of disorders, the victims of which gave a history of exposure to cold.

As a consequence of this it became the fashion to ascribe *visceral* affections to rheumatic influences, a grievous backsliding when we bear in mind that Ballonius had long since endeavoured to restrict the use of the term to the joints, or at any rate the external parts.

Indeed, throughout the eighteenth and the early part of the nineteenth centuries, it became the fashion to attribute many internal disorders to a rheumatic taint.

This unwarrantable perversion of the term "rheumatism," however, was gradually curbed by the data drawn from our advancing knowledge as to the pathogeny of the disease, and the morbid changes produced by it in the various tissues and organs.

A profound change had, in truth, come over the cast of medical thought and inquiry, and, forsaking speculative and vain imaginings as to the cause of disease, physicians now endeavoured rather to localize disorders—to link them with definite structural changes in organ and tissue.

The improvement, too, in diagnostic methods hastened the process of enlightenment, and gradually the territory allotted to rheumatism shrank once more within reasonable limits, as certain visceral disorders and divers diseases of the bones and affections of the nerves were isolated and withdrawn from its province.

There still remained, however, an imposing clinical and pathological residue, when we bear in mind that the term included "all painful affections of the joints and muscles, with their tendons and fasciæ, which are due either to chill or to causes which cannot be ascertained, and are therefore assumed to be atmospheric."

Withdrawal of Arthritis Deformans and Charcot's Joints from the Rheumatic Category.—With the dawn of the nineteenth century, however, the work of differentiating this mass of heterogeneous joint affections developed apace, for through the researches of Landre Beauvais and Haygarth the great group generically termed "arthritis deformans" was withdrawn from the category of "rheumatic" diseases, and shortly afterwards the so-called "Charcot's joints" were definitely assigned a neurotrophic origin.

At this period of our historical résumé we see that by the withdrawal of these three great groups—*gout, arthritis deformans,* and the *nerve arthropathies*—the domain of rheumatism has through these several allotments undergone substantial shrinkage.

Elimination of the Infective Arthritides.—Yet again was its territory destined to become still more restricted, for the results of clinical observation made it only too plain that under the term "rheumatism" had been wrongfully included many varieties of arthritis which we now know to be due to specific infections.

The honour of emphasizing this source of fallacy was reserved for M. Bouchard, who in 1881 formally proclaimed the essential distinctness from acute rheumatism of these types of arthritis, but to which, in deference to that tyranny of words we have before deprecated, he applied the somewhat misleading designation *les pseudo-rhumatismes infectieux.*

The work of differentiating from acute rheumatism those varieties of arthritis that follow infectious states has advanced with striking swiftness through the flood of light thrown upon these conditions by the researches of bacteriologists, and we are familiar now with a surprising array of infective arthritides—gonococcal, syphilitic, influenzal, pneumococcal, to mention but a tithe of those affiliated to some specific organism.

By the consecutive disengagement of gout, arthritis deformans, the nerve arthropathies, and the infective arthritides, the term "rheumatism," at one time the most comprehensive in nomenclature, has now been brought within at any rate reasonable distance of exact definition.

Modern Significance of the Term "Rheumatism."

At the present time, under the most liberal interpretation, the word "rheumatism" comprises the following conditions: Acute and subacute articular rheumatism, the so-called "abarticular" forms, as well as chronic rheumatism.

But even these comparatively meagre pretensions on behalf of the term seem destined to undergo considerable pruning.

For there is now a widespread inclination to restrict the usage of the word to the acute polyarthritic affection—viz., rheumatic fever. In accordance with this strict delimitation, many would relegate to *chronic* rheumatism the subacute and abarticular varieties.

But to this view we cannot wholly subscribe, for to our mind it seems unjustifiable to include under the designation "chronic rheumatism" those milder varieties of rheumatic fever classed by most writers as *subacute rheumatism.*

For the polyarthritic distribution, the raised temperature, and in children the not infrequent association of peri- or endo-cardial complications, sufficiently attest their nearer kinship to acute rheumatism.

In our opinion, therefore, pending fresh knowledge as to their intimate etiology, these types are with greater propriety classed under acute rheumatism, of which to all intents and purposes they appear to be an attenuated variant.

Neither to our mind does it seem expedient to include under chronic rheumatism those *abarticular manifestations*, *chorea*, *erythema nodosum*, etc. For these conditions also are obviously, like the former, more closely related to the *acute* than to the chronic variety of rheumatism. Moreover, they are in addition well-established clinical entities, possessed withal of a precise nomenclature. On these grounds, therefore, they are legitimately entitled to a separate niche—as much so, indeed, as any other condition causally related to acute rheumatism, as, for example, cardiac disease.

Clinical Content of So-called Chronic Rheumatism.

Despite withdrawal of the foregoing, there still remain under chronic rheumatism three entities—(1) Chronic articular rheumatism; (2) muscular rheumatism; (3) neuralgic rheumatism.

Many years ago that sagacious physician, Hilton Fagge, pertinently remarked: "Chronic rheumatism ought to mean a chronic arthritis of the same pathology as the acute outbreaks of rheumatic fever. Such a disease, we may affirm, does not exist."

Few indeed will deny that there was much to justify Fagge's interrogatory attitude towards this question. Thus, rheumatic fever is " a specific acute infective fever characterized by sweats, shifting inflammatory changes in the joint and related structures, in the heart, and in the serous membranes."

Taking this as our criterion of definition, it is difficult to establish anything in common between it and chronic articular rheumatism beyond the mere fact that the morbid process in both instances is of *articular* localization. But that such chronic arthritic troubles should supervene occasionally in those who have previously suffered from acute rheumatism can hardly be held to justify the assumption that they are identical in nature. For it is only reasonable to suppose that, subsequently to an acute polyarthritis, the joints, as *loci minoris resistantiæ*, become more susceptible to noxious influences of intrinsic or extrinsic origin, even as after an attack of measles the respiratory organs incur an increased liability to catarrhal and other disorders—legacies, as it were, of this particular exanthem. Moreover, even this spurious link with acute rheumatism is more often than not lacking, the articular affection frequently arising insidiously without any assignable cause.

Apart from these considerations, the clinical features of the affection, its more *local* character (except in the rare generalized type, *le rhumatisme chronique fibreux*), its relative lack of constitutional disturbance, its immunity from cardiac affections, and, broadly speaking, its age incidence sufficiently attest its essential distinctness from rheumatic fever.

Having defined our attitude on this vexed point, it now remains for us to indicate as clearly as possible the character of the joint affections classed as chronic articular rheumatism.

This end, we believe, is only to be attained by the indirect process of exclusion; in other words, we have to withdraw all arthritides which have, so to speak, been catalogued, and then to concentrate our attention on the residuum of joint disorders which remain undifferentiated.

To summarize, the arthritides that have been isolated are gout, arthritis deformans, the specific infective forms of arthritis, including acute articular rheumatism and the arthropathies that sometimes accompany central nerve disease, pulmonary disorders, and hæmophilia.

Now the question arises, what are the residual joint disorders —viz., those that cannot be affiliated to any of the foregoing categories ?

Joint Affections usually included under Chronic Articular Rheumatism.

As a result of our clinical experience, we find that, when analyzed, they fall into three main groups, attributable to **infective, traumatic,** or **static** causes, and these are the cases which by common usage pass muster as chronic articular rheumatism.

Of these three forms of joint disorder, the most important and numerically predominant variety is the *infective,* and its consideration demands a brief digression.

Broadly speaking, the infective arthritides can be divided into two main groups: (1) The *differentiated* types associated with specific germs; (2) the *undifferentiated* varieties, in which the causal microbe has not as yet been identified.

Under the former are classed the joint disorders of tubercle, syphilis, gonorrhœa, pneumonia, influenza, typhoid fever, dysentery, glanders, spinal meningitis, not to mention those of scarlatina, diphtheria, mumps, variola, and measles.

It is, however, with the *undifferentiated* group we are chiefly concerned, and while, as before stated, no germ has been isolated, still, their *onset, general clinical features, and course* are so strikingly similar to those of the specific or differentiated types, that there is little reason to doubt that they also are of *infective* origin.

But though the probabilities are strongly in favour of such an origin, yet in this country, at any rate, they still for the most part pass under the designation " chronic articular rheumatism."

This statement is based on a comparison of the clinical features of cases seeking entry to the Royal Mineral Water Hospital, Bath, with the nomenclature invoked by their respective medical attendants to denote the condition.

Examples of this nature find their way to this institution from all parts of the British Isles, and the criterion taken, therefore, may, we think, be held as fairly representative of the general attitude of the profession on this particular point of terminology.

Traumatic and Static Types of Arthritis erroneously regarded as "Rheumatic."—We will now pass on to consider the bearing of trauma on the genesis of certain types of joint disorder, commonly reputed to be "rheumatic" in nature.

Our forebears, as we know, recognized a *subacute rheumatic synovitis,* generally of monarticular distribution, and affecting especially the shoulder and knee.

Now, it may be said that there is no evidence whatever of any direct continuity between this type of synovitis and acute rheumatism; indeed, any diathetic taint that may be present is generally of *gouty* nature. Moreover, closer observation has shown the almost invariable presence of a positive factor in the shape of *trauma,* which has sufficed for its production.

In this connection, its predilection for the *knee* and *shoulder* is not without significance, especially liable as these articulations are to the effects of injury.

Lastly we have to consider certain types of arthritis generally held to be "rheumatic," whose production, we believe, is attributable to *static* disturbances.

Thus the older physicians laid great stress on what they termed *rheumatic dendritic synovitis,* in which the change was predominantly one of hypertrophy of the synovial villi. They drew a sharp distinction between this variety and subacute rheumatic synovitis in which the membrane undergoes simple thickening by fibrous undergrowth.

As to its assumed "rheumatic" origin, it is extremely doubtful whether this contention of our forefathers can be substantiated, and, for our own part, we have failed to discover any grounds for such an hypothesis.

This condition of villous synovitis is most commonly met with in the joints of the lower extremities, more particularly the knees. Now, if one joint only be affected, it is usually traceable to a previous trauma. But when, as is more common, the disease is symmetrical and has attacked both knees, its development is generally attributable to some strain imposed on both articulations by a static deformity of bilateral distribution, double flatfoot, etc.

The propriety, therefore, of retaining either of these forms of synovitis in the category of "chronic rheumatism" is distinctly questionable. To be candid, their retention savours largely of slavish concession on our part to ancient interpretations of what constituted "chronic rheumatism."

The sum, then, of our reflections on the content of chronic articular rheumatism indicates that the only joint affections which can legitimately, and even then only provisionally, be retained within that order are the *infective arthritides of undifferentiated type.*

On the other hand, for reasons assigned, the "traumatic" and "static" varieties of synovitis stand without the pale of this category, and we shall therefore devote special sections of this work to their considerations.

"*Rheumatic*" *Affections of Bursæ.* — For almost identical reasons, it is extremely doubtful whether the contention of the older physicians, that many forms of bursitis were of "rheumatic" nature, can be substantiated, much less so their assumption that a definite group, "bursal rheumatism," could be distinguished.

The results of modern research more and more accentuate the prominence of *trauma* and mechanical or static agencies as etiological factors in bursitis, and in this way many cases formerly held as "rheumatic" are now regarded as traumatic in origin.

At the same time, it must be borne in mind that, apart from the well-known forms of bursitis induced by syphilis, tubercle, gonorrhœa, and other specific infections, there is increasing evidence that bursitis may also follow tonsillitis and other infections of undifferentiated type.

But the known infections, syphilis, gonorrhœa, and tubercle, account for but a tithe; and in regard of the remainder, they have not hitherto been affiliated to any germ, and so in regard of their genesis we are left with only one known ascertained etiological factor—injury.

That even in such cases the inevitable organisms will eventually be found seems only too probable, but provisionally, at any rate, we have decided to withdraw them from the "rheumatic" category, and shall consider them in a separate section, as being of *traumatic* or *mechanical* origin.

Muscular Rheumatism.

Similarly, in this sphere our observation leads us to believe that the same three groups can be distinguished—those of infective, traumatic, or static origin.

Infective Types.—It will be seen later on that there is increasing evidence that these agents are a fertile source of interstitial types of myositis. Thus, of the specific organisms, the gonococcus has actually been isolated *in situ* in the inflamed muscles, while syphilis is a well-recognized cause of muscular inflammation. Recently, too, Poncet has drawn attention to the fact that in the attenuated variety of tubercle—*le pseudo-rhumatisme tuberculeux*—the muscles, like the joints and nerves, are implicated. Again, in acute rheumatism muscular lesions are relatively common, and so we see that there is cumulative proof of the efficiency of various organisms as a cause of muscular rheumatism or interstitial myositis.

Lastly, we have the fact strikingly demonstrated by Rosenow, that not only the specific germs, but also various strains of streptococci of attenuated virulence, are capable of initiating inflammatory changes in the interstitial fibrous tissues of the muscles, and it seems highly probable that in the vast majority of cases of muscular rheumatism the development of the affection is due to such *subinfection.*

Traumatic Types.—A well-defined class is that variety of muscular rheumatism or fibrositis which is frankly attributable to trauma, and that of such severity as to cause organic damage and secondary inflammatory changes in the muscular and tendinous structures. These, therefore, will be dealt with under the second main section of this work—Traumatic Fibrositis.

Static Types.—In addition to these infective and traumatic types, we have to consider that vast group of most varied character in which muscular pain and stiffness ensue as the result of *static* or *mechanical* derangements, more particularly in the lower extremities.

It would not be possible here adequately to discuss all aspects of this wide subject, but for the sake of clearness we will cite one example.

Take, for instance, the condition of weak, flat, or pronated feet, the commonest type of static deformity in the lower limbs.

The condition, as we know, may be devoid of local pain, but at the same time may be a fertile source of remote or secondary pain in the calf, gluteal, or lumbar muscles.

Now, speaking from extensive experience, we can without hesitation affirm that the pains due to this and other static deformities are with deplorable frequency erroneously regarded as " rheumatic," and the mechanical factor in their production wholly overlooked.

We would deprecate most strongly the irrational habit of flippantly referring such static pains to " rheumatic " causes, and would emphasize the urgent necessity of, at any rate, excluding gross static deformities before arriving at such conclusions.

Neuralgic Rheumatism.

In this, the third main variety of chronic rheumatism, there is the same urgent need for more accurate etiological differentiation. The reprehensible tendency, far too prevalent, of referring off-hand sciaticas and brachialgias to " rheumatic " agencies, cannot be too strongly deprecated, for, to be candid, it amounts to nothing more than a restatement of the problem we wish to solve. It is, indeed, high time that we escape from the cheap fallacy of regarding the term " rheumatic " as self-explanatory, and therefore final.

Approached in a discriminating frame of mind, one more alive to the results of modern research, we soon realize that the majority of such cases, at any rate, can be referred to infective, traumatic, or static influences.

Infective Types.—It is becoming more and more evident that many so-called " idiopathic neuralgias " are really attributable to specific microbial agencies. We need only allude to the cumulative proof that *gonorrhœa*, both in its acute and chronic states, is a fertile, though insufficiently recognized, cause of sciatica and brachialgia.

The potency of *tubercle*, too, as a cause of such neuralgias has apparently been under-estimated, as witness the stress laid by French physicians on what they term " pretubercular sciatica."

The view, also, of the older practitioners, that *syphilis* was a cause of sciatica, though it fell into disrepute, has recently been revived by Fournier and others; while to these, again, must be added the types associated with *typhoid*, *dysentery*, and other specific infections.

In this way we see how the content of " neuralgic rheumatism" is surely, though gradually, shrinking, and this in a manner quite comparable to what we have observed in regard of the arthritic and muscular varieties of " chronic rheumatism."

These latter, as we have seen, may not only be the outcome of specific infections, but their respective lesions are also capable of production by *streptococcal strains of attenuated virulence.* Reasoning by analogy, therefore, it seems highly probable that the etiology of many cases of sciatica and brachialgia, at present deemed idiopathic, is in reality referable to such processes of subinfection.

Traumatic Types.—Leaving aside the sciaticas and brachialgias resulting from incised or gunshot wounds, there is a group of cases in which falls on the buttock or shoulder, for example, are the unsuspected cause of sciatica or brachialgia, and the condition attributed to "rheumatic" influences.

The diagnostic error is the more likely to occur in that the appearance of the sciatica or brachialgia is often delayed to a period remote from the actual date of injury.

Closely allied are those types of sciatica which result from the constant repetition of movements calculated to produce undue traction on the nerve, such as are incidental to certain occupations. More interesting still are those types of brachialgia and sciatica whose development is the result of irritation produced by *abnormalities in shape or position of contiguous bony processes.*

The most noteworthy example, for instance, is the brachialgia associated with cervical rib, and previous to the advent of skiagraphy referred to diathetic causes. Also it may be noted that abnormalities in the shape of the lower lumbar transverse processes may in like manner give rise to pressure on the lumbosacral cord, with resulting sciatica.

Static Types of Brachialgia and Sciatica.—In regard to the former, we would note that its development is sometimes due to *drooping of the shoulder downwards and forwards,* and consequent displacement of the normal relationship of the humerus to the thoracic cage. Thus, as a result of the sagging of the humerus downwards and forwards, compression of the ulnar nerve between it and the first rib ensues, and a brachialgia results, which more often than not is erroneously attributed to rheumatism.

In the lower extremity such mistakes are even more common, and it would be difficult to over-estimate their frequency. As a typical example of this witness the frequency with which the secondary or remote pains of flat foot are wrongly ascribed to rheumatism. That these pains, variously referred to the calf, sciatic, or gluteal regions, are in reality of static origin is clearly shown by their swift disappearance after correction of the causal foot deformity.

Conclusions regarding the Clinical Content of Chronic Rheumatism.

In reference to the articular type, we are of opinion that the only class that can be legitimately included in this category is the *undifferentiated arthritides of infective origin.*

As will be gathered from the forthcoming clinical account, the joint lesions are of most varied character, ranging from those milder forms, currently termed " periarticular fibrositis," to that malign variety, *le rhumatisme chronique fibreux* (Jaccoud).

While these represent the two extremes, the majority of the cases occupy an intermediate position, constituting that large group, the infective, toxic, or septic arthritides, whose ultimate cause, microbial or toxic, is still unascertained.

In regard of the *subacute rheumatic and villous forms of synovitis*, we have, in view of their undoubted traumatic or static origin, decided to withdraw them from this sphere, and shall devote separate sections to their consideration.

As regards *muscular rheumatism*, the same broad line will be drawn between instances of infective or toxic origin, and those in which the morbid symptoms are attributable to frankly traumatic or to mechanical or static agencies.

Lastly, the same process of differentiation will be carried out in regard of *neuralgic rheumatism*—viz., the infective or toxic types will be as far as possible dissociated from those examples in which the neuralgic or neuritic process is the outcome of traumatic, mechanical, or static factors respectively.

Substitution of the Term " Fibrositis " for " Chronic Rheumatism."—This suggested change in the nomenclature is the direct outcome of the observation, by no means modern, that in " chronic rheumatism " the basal anatomical lesion is one of inflammatory overgrowth, or hyperplasia of the white connective tissues.

As far back as the beginning of the nineteenth century, Craigie, on anatomical findings, enunciated this dictum, one subsequently strongly advocated by Scudamore and Fuller. It is therefore, we think, somewhat singular that the significance of this masterly conception was apparently lost sight of, until Sir William Gowers, in a notable contribution on the subject, re-emphasized the essential pathological unity of all the different forms of chronic rheumatism.

In other words, whether the noxious microbe or its toxin singles out the fibrous investments of a joint, the connective-tissue envelope of a nerve, or the interstitial tissues of a muscle, the underlying condition is identical—viz., an inflammatory process in the white fibrous tissues at one or other of these particular sites.

Armed with this assurance, now firmly based on anatomical grounds, we can link up the apparently disconnected entities, lumbago, sciatica, pleurodynia, etc., seeing that they are but diverse expressions—only topographically differentiated—of one and the same underlying morbid change.

This being so, many have felt warranted in questioning whether the term "rheumatism" can with any show of propriety be retained for this disorder, which is not simply one isolated disease, but rather an agglomeration of affections of most varied etiology.

But at the same time, while the causal factors are diverse, their pathological influence is expended on the same anatomical structure—the *fibrous* elements.

Herein, to our mind, lies the most cogent argument that can be adduced in favour of displacement of the term "chronic rheumatism" by that of "fibrositis." For the former appellation, always indefinite, seems of late to have become even more so, while the word "fibrositis" at any rate gives to the affection, as it were, "a local habitation and a name."

Moreover, while this suggested substitute emphasizes and impresses on our mind the actual site of the anatomical lesions and their inflammatory character, yet it in no wise commits us to any unwarrantable assumption as to its more intimate pathogeny.

These are advantages not to be despised, for in this way we escape from the thraldom of that fallacious conception of the term "rheumatism" as being self-explanatory, and therefore final.

For, shorn of its original and humoral significance, it has indeed little save tradition to justify its continued usage in this connection; while, emancipated from its tyranny, a more catholic and at the same time eclectic frame of mind is engendered—one, we are fain to think, more calculated to advance and clarify our knowledge of this common everyday affection.

Synopsis and Arrangement of Subject.

Our general survey of chronic rheumatism, or fibrositis, being now achieved, it remains for us to outline the scheme of contents of this work.

Three main divisions constitute the skeletal framework—viz.:

1. Infective or toxic fibrositis.
2. Traumatic fibrositis.
3. Villous synovitis and sacro-iliac relaxation.

In regard of the first type (1), it will be subdivided into three main groups:

(*a*) Articular fibrositis, or chronic articular rheumatism.
(*b*) Myo-fibrositis, or muscular rheumatism.
(*c*) Neuro-fibrositis, or neuralgic rheumatism.

The general etiology and morbid anatomy of all these three types will be considered in the chapters preceding the account of their clinical features.

Under Group 2 (Traumatic fibrositis) we shall deal with—

(*a*) Subacute rheumatic synovitis.
(*b*) " Rheumatic " bursitis.
(*c*) Traumatic muscular fibrositis.

Under Group 3 will be considered—

(*a*) Villous synovitis of knee.
(*b*) Villous synovitis of hip.
(*c*) Sacro-iliac relaxation.

That we should have included in a work of this sort these " traumatic " and " villous " disorders may perhaps be objected to by the purist in classification, but this is, we think, largely condoned by our according to them separate consideration.

On the other hand, we strenuously maintain that any work purporting to give a true presentment of the clinical features of *chronic rheumatism* would be largely shorn of its accuracy and usefulness if it did not, as it were, in the same breath take cognizance of these conditions.

Their constant and deplorable confusion with chronic rheumatism would alone, in our opinion, constitute ample justification for introducing them into our monograph.

In regard of the traumatic types, no less an authority than Sir William Gowers, in discussing the subject of fibrositis, emphasized the desirability of considering simultaneously examples of traumatic origin, and, if we err, we are content to do so in such good company.

If the inclusion of traumatic types be conceded, it is easy to justify an extension of this concession to the villous types of synovitis and sacro-iliac relaxation, for, etiologically considered, is there much difference between these two groups ? Is it not rather quantitative than qualitative ?

Thus, for example, traumatic fibrositis is the outcome of some *sudden* and *violent* strain, whereas villous synovitis and sacro-iliac relaxation are the result of *gradual* and *slight, though persistent*, strain.

Again, these villous types of synovitis and sacro-iliac relaxation seem to have been regarded as no man's territory, and consequently we may look in vain in any textbook for any account of their symptomatology.

In this way a perfectly erroneous estimate of their frequency of incidence has been engendered. Yet, as a matter of fact, they are some of the most common types of joint disorder met with in everyday practice; but hidden under the mantle of chronic rheumatism their clinical entity has been veiled or submerged.

INFECTIVE OR TOXIC FIBROSITIS

CHAPTER II

GENERAL ETIOLOGY : PRIMARY OR ESSENTIAL CAUSES

OUR views as to the etiology of so-called "chronic rheumatism" have materially altered since the time, not so far distant, when the origin of any and all cases of this nature might, without fear of cavil, be laconically dismissed as due to "damp," "chill," or some such environmental circumstance.

We now realize that no pathological group could be based on this etiological concept which does not include many other disorders than the one under consideration. The joints and their related structures do not display any outstanding tendency to suffer from these atmospheric influences; much less can they be held to monopolize their morbific action to the exclusion of all other diseases.

Thus, by the older physicians the epithet "rheumatic" was applied to all diseases apparently caused by "chill," "damp," and so forth; but, obviously, on this basis the term was equally applicable to the large group of disorders of the respiratory organs, which exhibit a like, if not a pre-eminent, susceptibility to the effects of such adverse environmental conditions.

To be candid, it must be admitted that the causation of this common, painful, and often obstinate affection, fibrositis, is a far more complex problem—one into which many and diverse factors intrude their influence, some of which may provisionally be regarded as *primary* or *essential* causes, and others which exert an *exciting* or *determining* influence.

The fact that, in the present stage of our knowledge, no specific cause can be adduced indicates that a wiser plan for us to adopt will be to consider the various etiological factors seriatim, and subsequently to formulate such conclusions as to its origin as our data permit.

With this end in view, we purpose dealing. in the first instance with the age at which the onset of the affection took place, both in males and females, at the same time comparing the sexes in respect of their liability.

Age and Sex Incidence.

The following tables are the outcome of an analysis of 1,250 consecutive cases, of whom 1,000 were of the male and 250 of the female sex.

MALES.

Ages.	Number of Cases.	Percentage of Cases.
1 to 10	2	0·2
11 ,, 20	31	3·1
21 ,, 30	154	15·4
31 ,, 40	237	23·7
41 ,, 50	222	22·2
51 ,, 60	227	22·7
61 ,, 70	120	12·0
71	7	0·7

FEMALES.

Ages.	Number of Cases.	Percentage of Cases.
1 to 10	—	—
11 ,, 20	16	6·4
21 ,, 30	56	22·4
31 ,, 40	55	22·0
41 ,, 50	58	23·2
51 ,, 60	51	20·4
61 ,, 70	13	5·2
71	1	0·4

In the foregoing table all forms of *fibrositis* are comprised—*i.e.*, as it affects the joints, muscles, and nerve trunks.

As we see, up to the age of twenty-one, its incidence in the female sex exceeds that of the male in the ratio of 2 to 1; in other words, only 3 per cent. of males, as compared with 6 per cent. of females, fall a victim before they attain their legal majority. From twenty-one onwards to sixty years of age the disparity ceases, both sexes, excluding those in the third decade, apparently suffering to the same extent. From sixty, however, to the allotted span of seventy years, we find males predominating to the extent of 12 per cent., as opposed to 5 per cent. in the weaker sex. Going more into detail, the following table will show the total percentage of the four varieties, and their respective percentage incidence in the male and female sex:

	Percentage of Each Variety in Total.		Males.	Females.
Arthritic fibrositis	318	25·4	71·7	28·3
Muscular fibrositis	244	19·5	75·0	25·0
Lumbago	145	11·6	96·5	3·5
Sciatica	543	43·4	91·9	8·1

Fibrositis of the Joints.— A table will now be interposed showing the incidence of this variety of the affection in successive decades in both the male and female sexes:

Ages.	Males.		Females.	
	Number of Cases.	Percentage of Cases.	Number of Cases.	Percentage of Cases.
1 to 10	1	0·4	—	—
11 ,, 20	17	7·5	13	14·4
21 ,, 30	36	15·8	17	18·9
31 ,, 40	53	23·2	18	20·0
41 ,, 50	44	19·3	18	20·0
51 ,, 60	56	24·6	19	21·1
61 ,, 70	21	9·2	5	5·6
	228	100·0	90	100·0

In the male series of 228, only one was observed under ten years of age, representing a percentage incidence of 0·4 in the first decade; 7·5 per cent. of the examples occurred between the ages of eleven and twenty, but between twenty-one and thirty the frequency amounted to 15·8 per cent. From thirty-one to forty the percentage rose to 23·2, sinking between forty-one and fifty to 19·3, to rise again between fifty-one and sixty years of age to 24·6. Subsequently, however, between sixty-one and seventy years of age, a marked decline to 9·2 per cent. ensues. No cases were recorded after seventy years of age.

In the female members of the series, no cases were recorded under ten years of age, but between the ages of eleven and twenty their frequency amounted to 14·4 per cent.; between twenty-one and thirty, 18·9 per cent.; from thirty-one to forty, 20 per cent.; and the same between forty-one and fifty. Between fifty-one and sixty the frequency of the incidence rises to 21·1 per cent., declining later to 5·6 per cent. between sixty-one and seventy years of age. No cases were recorded after seventy years of age in the females.

Comparing the sexes in respect of the incidence of joint rheumatism, it may be noted that only one case occurred under ten years of age, and that in a boy. Between eleven and twenty years of age the condition is proportionately more frequent in women than in men, in the ratio of 48 to 25. This predominating frequency in women is maintained between twenty-one and thirty in the ratio of 19 to 16.

But between thirty-one and forty the incidence of frequency is reversed, 23·2 per cent. occurring in the male as opposed to 20 per cent. in the female sex.

In the succeeding decade, forty-one to fifty, the liability in the male is 19·3 per cent., and in the female slightly higher—20 per cent.

Between fifty-one and sixty years of age, however, the female liability rises to 21·1 per cent., while the male reaches even higher, to 24·6 per cent.; and between sixty-one and seventy years of age the male preponderance is still maintained, the ratio being approximately 23 to 14.

Fibrositis of the Muscles, not including Lumbago.—

Ages.	MALES.		FEMALES.	
	Number of Cases.	Percentage of Cases.	Number of Cases.	Percentage of Cases.
1 to 10	1	0·5	—	—
11 ,, 20	6	3·2	3	4·9
21 ,, 30	35	19·1	15	24·5
31 ,, 40	26	14·2	17	27·8
41 ,, 50	39	21·8	12	19·7
51 ,, 60	42	22·9	12	19·7
61 ,, 70	30	16·3	2	3·4
71	4	2·1	—	—
	183	100·1	61	100·0

It will be seen that in 244 instances the muscles bore the brunt of the disease, and here again males were in the majority, three times as many males as females being admitted into the hospital suffering from this variety of rheumatism. The earliest stage at which this affection was noted occurred in a boy under ten years of age, giving a percentage of 0·5 for the first decade of life. The percentage of cases occurring between eleven and twenty amounted to 3·2.

Of the remaining male cases, 19·1 per cent. occurred between twenty-one and thirty years of age. But between thirty-one and forty a decline to 14·2 per cent. ensues, to be followed by a steady rise from thence onwards to the age of sixty, 22·9 per cent. occurring between fifty-one and sixty years of age.

From sixty-one to seventy the percentage sinks to 16·3, while it may be added that only two cases were recorded in persons upwards of seventy years of age, giving a percentage of 2·1 for this period.

Taking the female sex, no cases were recorded under ten years of age, but 4·9 per cent. arose between the ages of eleven and twenty. Between twenty-one and thirty, 24·5 per cent. occurred, but in the succeeding decade the higher percentage of 27·8 was reached. Subsequently, between forty-one and fifty and fifty-one and sixty, the incidence declines to 19·7 per cent., afterwards dwindling to 3·5 per cent. between the ages of sixty-one and seventy.

Lumbago.—

Ages.	Males.		Females.	
	Number of Cases.	Percentage.	Number of Cases.	Percentage.
1 to 10	—	—	—	—
11 ,, 20	2	1·4	—	—
21 ,, 30	20	14·3	1	20
31 ,, 40	32	22·9	1	20
41 ,, 50	31	22·1	—	—
51 ,, 60	35	25·0	3	60
61 ,, 70	20	14·3	—	—
	140	100·0	5	100

No cases were recorded in males under ten years of age, and only 1·4 per cent. in the succeeding decade. Between the ages of twenty-one and sixty the percentage steadily increases from 14·3 to 25, declining again to 14·3 between sixty-one and seventy years of age.

In the females, none were recorded in the first two decades of life; from twenty-one to forty the percentage incidence is 20.

No cases were admitted between the ages of forty-one and fifty, but between fifty-one and sixty the percentage abruptly rises to 60.

None were recorded after this age.

Sciatica.—

Ages.	Males.		Females.	
	Number of Cases.	Percentage.	Number of Cases.	Percentage.
1 to 10	—	—	—	—
11 ,, 20	5	1·3	—	—
21 ,, 30	63	14·0	23	24·3
31 ,, 40	126	28·1	19	20·2
41 ,, 50	108	24·0	29	30·9
51 ,, 60	94	21·0	17	18·1
61 ,, 70	49	10·9	5	5·4
71	3	0·7	1	1·1
	449	100·0	94	100·0

No cases were recorded between one and ten years of age, but it is interesting to note that Cotugno and others have recorded instances in children ranging from seven to twelve years of age. Between eleven and twenty years of age the low percentage of 1·3 is reached, but in the two subsequent decades up to forty the percentage rises from 14 to 28·1. Between forty-one and fifty it sinks to 24, declining still further to 10·9 up to the age of seventy. According to Lortat-Jacob, sciatica is most common between fifty and seventy. The frequency of its incidence in middle and advanced life is, he thinks, accounted for by the increased chances of traumatism and infectious processes. Above seventy years of age the percentage has dropped to 0·7. According to Arnoldi, only 3 per cent. of cases occur after seventy years of age. In women no cases under twenty years of age were recorded, but between twenty-one and thirty the percentage of 24·3 was attained. Between thirty-one and forty it declines to 20·2, rising in the subsequent decade to 30·9 per cent.; hence onwards it drops from 18·1 to 5·4 between the ages of fifty-one and seventy, but after seventy-one it sinks to 1·1.

In comparing the frequency of sciatica in men, as compared to women, the ratio in our series is approximately 9 to 2. Valleix, Eulenberg, and Erb hold that the proportion of attacks in men and women is as 5 to 3, Romberg alone maintaining that women are more prone to the affection.

Conclusions.—In reviewing the foregoing data, the salient and outstanding feature is the predominating incidence of fibrositis in the male sex.

This disparity, while it holds good for all types of the affection, does so pre-eminently in the case of sciatica and lumbago.

As we saw, also, in fibrositis of muscles, not including lumbago, males were affected three times as commonly as women, and apropos of this we may allude to some statistics compiled by Besnier some years ago.

This observer, out of a total of 2,761 patients affected with muscular rheumatism, noted that no less than 1,825 were males, of whom 1,778 were adults and 47 boys; while of the 936 females attacked, 906 were adults and 30 girls.

Judging from these data as well as our own, we may take it as fairly well established that muscular fibrositis is much more common in men than in women.

In respect of the localization of the malady, it may be stated that the muscles of the neck were attacked most commonly in young subjects, those of the trunk in adult life, and those of the lumbar region and lower limbs during the same period, and also in old age.

As regards arthritic forms of fibrositis, our own data somewhat contravene the generally accepted view that this variety is exclusively confined to the middle-aged and old, as a reference to the foregoing table will show that a considerable number of cases (10 per cent.) in both sexes occurred under twenty years of age.

Still, as a general rule, it may be taken that the liability to all forms of fibrositis increases with advancing years; that in early childhood it is very unusual, but in the middle decades of life is one of the commonest and most troublesome complaints to which flesh is heir.

The greater frequency of attacks in males is probably due to the fact that they are more liable to exposure and privation; while their greater tendency to irregularities of life renders them more subject to those functional derangements which favour the development or occurrence of toxic states or processes of subinfection. In addition, moreover, they are, by their very occupations, more at the mercy of atmospheric vicissitudes and other exciting causes of the malady.

Gout.

Of all the conditions reputed to be etiologically related to fibrositis, in none of them is the connection more obvious or more easily traceable than between this affection and gout.

Whether or no the hyperplasia of the connective tissues be directly due to the gouty toxin may be open to doubt, but there can be none as to the relatively frequent incidence of fibrositis in the subjects of ancestral or acquired gout.

Thus, in a series of 1,000 cases, hereditary or acquired gout was present in no less than 281—that is, a percentage incidence of 28·1. While this taint was more in evidence in fibrositis of the joints, it obtained appreciably in regard to all muscular types of the affection, more especially lumbago, its influence being also very obvious in the case of sciatica and other types of nerve sheath involvement.

In the light of our own observations, therefore, we must admit to being somewhat nonplussed at the dogmatic attitude of those who, with, to our mind, overwhelming confidence, contend that gout plays little or no part in the production of this condition.

Speaking from a somewhat extensive experience, we unhesitatingly affirm that the reverse is the case, and that the gouty element is but too frequently overlooked in examples of this disorder.

To take another aspect of this vexed question of the relationship of gout, how is it possible to reconcile the ambiguous attitude of those who, while denying it any share in the causation of *lumbago* and other types of muscular fibrositis, yet would at the same time assign to it an important etiological rôle in the genesis of the allied conditions, *sciatica* and *brachialgia ?*

Thus, it is sometimes maintained that the fleeting attacks of lumbar fibrositis, or lumbago, which ensue after dietetic indiscretions, have no relation to gout, but are simply indicative of some digestive disability on the part of the individual for certain articles of diet.

This, however, does not, to our mind, constitute a satisfactory mode of differentiation; much less can it be held to put out of court its influence. For is it not a matter of everyday experience that the gouty are precisely those persons who display this inability to deal satisfactorily with unusual or excessive meals ?

Hence the frequency with which transient attacks of lumbar fibrositis almost invariably ensue when any unwonted excess of purin-containing food has to be disposed of, and especially when at the same time katabolic changes have been stimulated in the body by the ingestion of alcohol, not necessarily excessive in amount.

That the *lumbar* regions should have been singled out is the more remarkable; for if there be one form of fibrositis more than another prone to be associated with gout, it is precisely lumbago.

Our difficulty, moreover, in appreciating the cogency of this plea for the exclusion of its influence in lumbar and other types of muscular fibrositis, is accentuated by the fact already mentioned—that those who advocate it at the same time assert that gout is the salient etiological factor in sciatica and brachialgia.

The untenability of this divided attitude is, to our mind, obvious, and for the following reasons: The pathological lesion in both instances is the same—viz., fibrositis—implicating in lumbago and deltoid rheumatism the sheaths and interstitial tissues of the muscles, and in sciatica and brachialgia the similar investments of the nerves. Strictly speaking, therefore, any differentiation that we can effect between muscular and neuralgic types of fibrositis is merely *topographical.* Indeed, the very continuity of the fibrous connective tissue favours the passage of one type into the other; and so clinically we find that a large percentage of cases of sciatica are preceded by lumbago, and in the same way many cases of brachial neuralgia or neuritis develop by extension out of a pre-existing deltoid fibrositis.

In the light of such transitions of muscular into neuralgic types of fibrositis, it seems inconsistent to postulate a gouty origin for the latter, and at the same time to deny it any share in the production of the former. For ourselves, we fully recognize gout as the most potent predisposing factor in sciatica and brachialgia, and ergo for the closely associated and often antecedent muscular types of fibrositis.

While insisting on the importance of gout as a predisposing factor in fibrositis, we feel called upon to emphasize the fact that we are not sheltering ourselves under that nebulous term "latent gout." For our contention is based on the ground that, in the vast majority of the cases for which we claim a gouty origin, objective signs of gout, such as tophi, etc., were obviously present.

Incidence of Gouty Stigmata in Various Types of Fibrositis.—Out of 343 instances of fibrositis of the joints, such stigmata of gout were present in 118 males and 9 females.

Pursuing our inquiry in regard of muscular types, and taking as our example lumbago, we find that, out of a total of 27 cases of this affection, as many as 10 afforded definite evidences of a gouty taint.

Similarly, out of 38 cases of lumbago complicated by other manifestations of fibrositis, 11 males and 1 female, and, in 23 cases of lumbago associated with arthritic fibrositis in the limbs, 6 males, but no females, were of gouty habit.

Lastly, out of 38 cases of lumbago complicated by right or left sciatica, 10 were of the same diathesis.

Passing in turn to consider this same factor in relation to sciatica, we note that, out of 142 examples, 24 men and 3 women were gouty. Occasionally, too, apart from glycosuria, it appears to be responsible for bilateral sciatic pains, for in 3 examples of this nature gout was present.

The results of our own experience would, therefore, seem to strongly support Sir William Gowers, who, discussing muscular fibrositis, comes to the following conclusion: "It is currently associated with gout, and the truth of the belief is soon impressed upon the practitioner. But it is gout with a difference. It may occur in those who are gouty in the common sense of the word; but some of the most severe cases I have seen, especially the brachial form, have been in those who have inherited the tendency to gout, but have not merited its development."

Again, apropos of muscular types of fibrositis, especially lumbago, Garrod maintains that they are frequently and obviously related to gout—an opinion shared by many other authorities, notably Hilton Fagge.

Charcot too long since pointed out that gout alternates with sciatica, or supervenes simultaneously; and we may add that, although a sciatica born of gout may be, and is often, extremely inveterate, it is not always so.

Gowers, on this question, insists that " Underlying most cases of sciatica is either the state of definite gout, or that rheumatic diathesis in which the *fibrous* tissues suffer, especially those that are connected with muscles, a form closely connected with common gout by coexistence or descent."

Lortat-Jacob and Sabaréanu also, who have recently dealt most exhaustively with sciatica, regard gout as a very frequent and efficient factor in its production.

Summary.—The foregoing reflections clearly show that fibrositis develops with significant frequency in the subjects of ancestral or acquired gout. Now the salient question arises, whether or no the *materies morbi* of gout is of itself sufficient to originate fibrositis. This, obviously, is not a question that admits of dogmatic assertion either way, but we feel convinced that in very many instances it plays the part of a *predisposing* rather than a proximate cause. As to its *modus operandi*, this is to a large extent speculative, seeing the mystery which surrounds the more intimate pathogeny of gout.

Having regard, however, to the fact that so much exact evidence is forthcoming in favour of local infection as a cause of all types of fibrositis, we cannot refrain from expressing our belief that a gouty diathesis in some obscure way favours a process of *subinfection*, especially from the alimentary canal.

In support of this we have the well-known clinical fact that gouty persons who contract gonorrhœa are very prone to develop gonorrhœal rheumatism—in other words, a widespread infection involving the fibrous tissues, not only of joints, but also of muscles, and even nerve sheaths.

With this concrete example to hand, is it not reasonable to suppose that such a constitutional taint will also favour the occurrence of other infections or subinfections of hitherto *undifferentiated* type, and that this may explain its relative frequency in persons of this cast ?

Exposure to the Action of Lead.

That hyperplasia of the interstitial fibrous tissues may occur in the subjects of lead-poisoning is well known, and consequently it is not to be wondered at that such persons sometimes suffer from so-called " rheumatic " pains.

In only seventeen of our series was there any history of such exposure, and in the majority of these, as so frequently happens, gout in addition was present.

The exact relationship of plumbism is somewhat obscure, for in some cases, presenting all the classical symptoms of saturnine poisoning, no signs of "rheumatism" appear. On the other hand, other individuals, equally exposed to its effects, may show none of the phenomena peculiar to plumbism, but nevertheless suffer from severe "rheumatic" pains.

It seems probable, therefore, that this varied reaction on the part of individuals is referable to some constitutional peculiarity involving especial vulnerability on the part of their fibrous tissues to this particular poison. The "rheumatism" or fibrositis due to lead is seldom acute, arising as a rule in a very insidious manner.

Heredity.

Fuller, in his classical work on "Chronic Rheumatism," strenuously maintained that rheumatism, like gout, is distinctly hereditary, and, to quote his own words, "from father to son its seeds are transmitted, and bear fruit in exact proportion to the degree in which circumstances prove favourable to their growth."

But, for our part, we would submit that the sole proof of any direct transmission of a tendency to fibrositis resides in the fact that it is so markedly prone to arise in the offspring of the gouty, and in this sense only do we believe it to be hereditary.

As we pointed out in our section on Gout, we only claim this ancestral taint for those presenting definite uratic precipitations, and with this as our touchstone, naturally, the percentage is a comparatively low one.

But had we included all other vague "acidities, flatulencies, megrims, and biliousnesses, of whatever occult kind," as indicating a gouty strain, doubtless the percentage would have been considerably higher.

Infections.

We here enter upon a discussion of what bids fair to be the most productive field of research into the etiology of chronic rheumatism or fibrositis.

Our study may well be prefaced by a few brief reflections on the *specific* infections, more particularly on the striking parallel that can be drawn between their varied manifestations and those characteristic of chronic rheumatism.

To begin with, a remarkable change has taken place in our attitude towards infective disorders, such as acute rheumatism, gonorrhœa, and so forth, in that we now realize that they are no longer to be regarded as local, but rather as *general systemic infections.*

Thus, under the influence of bacteriological findings, our conceptions regarding *gonorrhœa* have undergone enlargement, and we now recognize that, apart from articular complications, there may be also associated muscular and nerve lesions; in short, the fibrous elements in no part of the body are immune from its effects.

Again, in regard of *acute rheumatism,* though its causal organism remains *sub judice,* still, there is cumulative evidence that involvement of the muscles is relatively common, and also that the nerve sheaths, though less frequently, are implicated.

The same also is true of *dysentery,* which, as Sydenham pointed out, may be marked by muscular and arthritic pains; while others more recently emphasize the frequency with which neuralgias occur in connection therewith.

A similar association of muscular, articular, and nerve lesions is common in *syphilis,* and French physicians insist that myalgias and neuralgias, as well as joint lesions, are vastly more common in *tubercle* than is generally recognized. Again, the organism of *post-scarlatinal rheumatism,* whatever its nature, betrays a penchant for attacking the tendon sheaths as well as joints, and, comparably with the gonococcus, displays an affinity for the bursæ. We see, therefore, that *articular, muscular, and nerve lesions, singly or combined, are the commonest complications of specific infections.* Now, this triad of articular, muscular, and nerve lesions is precisely the content of so-called "chronic rheumatism," and the question naturally arises, Are they not susceptible of a similar explanation—viz., an infective basis ?

To elucidate this all-important problem, we shall proceed along the following lines:

1. A critical comparison will be instituted between the arthritic, muscular, and neuralgic types, respectively, of chronic rheumatism, and these same manifestations as they occur in association with specific infections.

2. We shall discuss the possible sites of infection or toxic absorption, and the relationship thereto of the following factors: local foci of infection, variations in gastric acidity, intestinal derangements and stasis, and urinary changes.

3. We shall consider the positive bacteriological data in favour of infection as the direct cause of the anatomical lesions, and here also will be noted the results of recent researches on

the microbial and cytological content of the joint fluids, and also the evidence forthcoming of latent tuberculous or syphilitic infection in these subjects of chronic rheumatism.

4. The experimental production of the anatomical lesions in animals by inoculation of various organisms will be dealt with.

5. We shall, in the light of the foregoing sections, proceed to review the evidence in favour of *auto-intoxication* on the one hand, and *subinfection* on the other, and subsequently to summarize our conclusions as to the respective merits of these opposing views in regard of the etiology of chronic rheumatism.

Analogies between Chronic Rheumatism and Specific Infections.

Arthritic Types.—As indicated in our introductory chapter, the forms of arthritis commonly classed under this designation approximate very closely in their clinical features to those typical of the specific infective arthritides.

Indeed, as we shall see later in our clinical account, accurate differentiation depends entirely on whether or no the causal microbe can be identified, and there is no doubt that, with increasing resort to bacteriological investigation, many of the cases whose origin is cryptic and therefore presumably "rheumatic" will in reality be found capable of affiliation either to specific or hitherto unisolated germs.

To begin with, the term "chronic" is certainly inapplicable to many of these cases, whose *onset* more often than not is *abrupt*, and attended by *pyrexia of irregular or septic type.* If to this, again, be added the fact that leucocytosis is not infrequently present, and the related glands enlarged, also sometimes even the spleen, we see how reminiscent these features are of known infective types of arthritis.

In regard of the *articular lesions*, too, a similar resemblance obtains, for, as in the specific arthritides, the salient feature is their varied character and distribution. Thus, taking a broad view of so-called "chronic articular rheumatism," we know that it may assume the form of a fleeting arthralgia, a transient synovitis, or, in the more severe varieties, an obstinate periarthritis, which may be mono-, oligo-, or poly-articular in extent.

Is not this strikingly reminiscent of what we find in that most typical specific infection, gonorrhœa, which, though it has a predilection for periarticular involvement, yet is often betokened by a simple arthralgia or an evanescent synovitis?

The same polymorphism characterizes the joint lesions met with in syphilis, tubercle, scarlet fever, and other exanthemata.

Again, the *course* and *termination* of the undifferentiated arthritides closely resemble those of the specific forms, if we except the relatively rare incidence of suppuration in some of the latter types. The milder varieties, betokened by arthralgia or synovitis, tend commonly to disappear, as it were spontaneously, in precisely the same manner as the arthralgias and synovites that follow the exanthemata, and we presume that, comparably with these latter, the source of infection dries up, and resolution follows. Such rapid subsidence is by no means invariable, and the characteristic mode of evolution of the more severe forms is that the initial synovial effusion is replaced by progressive infiltration and thickening of ligaments, capsule, and related tendinous and aponeurotic structures.

Given a polyarticular distribution of such lesions, we are forthwith confronted by the clinical picture of *le rhumatisme chronique fibreux* (Jaccoud's type), though more commonly the disorder is less widespread, and is mono-, or more typically oligo-, articular in extent. In their predilection for an oligo-articular distribution they exactly conform to what is true of the specific infective arthritides.

Leaving aside the inapplicability of the term " rheumatism " to these types of arthritis, it is, as before remarked, questionable whether the prefix " chronic " is appropriate. For the course they pursue is not one of steady, uninterrupted progress, but one marked rather by periodic or intermittent advances, as if seemingly due to a series of *successive infections or subinfections.*

This mode of progression is characteristic of all the more severe varieties, even Jaccoud's type. It will be recollected that in his classical instance the disease only attained to maturity after a series of four or five attacks of what was believed to be acute articular rheumatism.

One is the more inclined to take this view of a serial infection from the well-known fact that some of the more virulent types of gonorrhœal rheumatism in their terminal stages present a picture clinically indistinguishable from that of Jaccoud's variety.

Now, the gonococcus is relatively a long-lived organism, and presumably the acute exacerbations which mark the course of such severe forms are really attributable to intermittent absorption of fresh doses of the toxin from some smouldering infection in the prostatic urethra.

In conclusion, from the foregoing considerations, it is clear that, failing positive clinical or bacteriological evidence of the associated malady or primary affection, it is impossible to clinically differentiate the specific infective arthritides from the undifferentiated types. In other words, the clinical features and evolution of the latter are not only compatible with, but strongly suggestive of, a similar infective genesis. Later we shall see how far these inferences from the clinical symptomatology are borne out by positive bacteriological findings.

Muscular Types.—In this variety still more emphatic intimations of an *infective* source may be gleaned from a consideration of the clinical phenomena. Briefly put, the features most suggestive of such an origin are—*Suddenness of onset, pyrexia, endocardial complications, tendency to epidemicity,* and *occasional transition into acute articular rheumatism.*

The onset of these muscular types is dramatically abrupt, and often marked by considerable constitutional disturbance.

Indeed, it is often too readily assumed that attacks of acute muscular rheumatism are afebrile, but if more attention were paid to this point, it would be found that a rise in temperature is by no means rare, even in the more evanescent forms of lumbago, torticollis, and so forth.

Again, it can scarcely have escaped the notice of practitioners that their cases of acute muscular rheumatism do tend to appear very frequently in batches, somewhat suggestive of epidemicity or the operation of some common cause.

Thus, Leube has alluded to the greater prevalence of the disorder during the spring, and its tendency to assume an epidemic form. Out of his series of 200 examples, one-sixth developed endocarditis, and one-third were attended by pyrexia and pronounced "constitutional disturbance." He believed it to be identical with acute articular rheumatism, save only that bacteriological evidence was lacking.

Newton, too, has reported an epidemic of forty-three cases seen by him within the short period of five weeks. The abdominal and lower intercostal muscles were most commonly involved, occasioning painful, short, and rapid respirations; but in some instances the lumbar and sacral muscles were attacked. The onset was acute, the temperature 100° to 104° F., the pulse 80 to 100, with a furred tongue, headache, and typical sour acid sweats. There were neither nasal nor pulmonary complications, which assisted in the differentiation of the condition from influenza.

He also held the disorder to be infective and identical with acute articular rheumatism for the following reasons:

1. There was no influenza prevalent at the time.
2. There was none of the subsequent depression typical of influenza.
3. They responded promptly to salicylates.
4. It was apparently mildly contagious, three cases occurring in one household.

5. There was endocarditis in two of the forty-three cases; these were not treated with salicylates.

6. The epidemic occurred after an unusually wet summer, and low in the valley of the Medway.

Additional evidence of epidemicity is forthcoming from *veterinary* observations. Thus, Tatray states that in the breeding establishment at Maesohegyes he has noted that during vernal and autumnal seasons acute muscular rheumatism assumes an almost epidemic form in foals of six months to two years old.

Again, apart from the fact that endocardial complications have been noted in such epidemic outbreaks, we would emphasize their occurrence in sporadic form, even in mild cases of lumbago, stiff-neck, and other localized types of muscular rheumatism.

In this connection, too, we would draw attention to the following significant coincidence: Endocarditis, as we know, often develops in children showing no other rheumatic manifestation than so-called "growing pains." Yet even in such examples painful and recent nodular infiltrations are sometimes detectable in the muscles. That the existence of such is not more often established is hardly surprising, the more important cardiac trouble masking the less obtrusive muscular lesions.

An additional evidence of infection might also be adduced from the occurrence, though rare, of *erythematous*, *urticarial*, and *petechial* eruptions in association with acute muscular rheumatism.

Lastly we have to draw attention to the *overlapping of acute muscular rheumatism and acute articular rheumatism.* This is shown by the fact that in some instances localized types of muscular rheumatism have been observed to develop into a genuine attack of acute articular rheumatism.

We have ourselves observed this sequence in the case of simple stiff-neck passing without break into acute rheumatism with cardiac lesions. Recently Kerr has advanced the view that acute rheumatic fever may have as its first manifestation similar involvement of the abdominal muscles, and he reports three instances in support of his contention.

Moreover, not only may acute muscular rheumatism precede acute articular rheumatism, but, on the other hand, there is a tendency on the part of the latter to borrow, as it were, some of the features distinctive of the acute muscular type.

Thus, as far back as 1852 Wolff described an inflammatory affection of the recti abdominis and the pyramidalis muscles in this association, and Weitkemper has also noted a similar instance.

Examples of polymyositis complicating the same disease have also been reported by Schnell, Riess, and Leube, and we would mention in this connection, also, Sacharjin, Heinz, and Senator.

It is significant that these inflammatory changes in the muscles in acute articular rheumatism, though localized most frequently in those related to the affected joints, yet sometimes involve those remotely situated.

In rare instances, too, displacement of the articular by muscular manifestations and the reverse have been observed, the sequence occurring with such rapidity as to suggest that the two conditions are but diverse clinical expressions of one and the same morbid process.

Again, that *intramuscular nodules* or thickening sometimes develop during acute articular rheumatism is fully recognized, and, indeed, the remarkable frequency with which similar indurations occur in the muscles in so-called "chronic rheumatism" has been construed by some as an indication that they are due to a common cause.

This *transition*, *coexistence*, and *alternation* of the symptoms of these two disorders—in view of the generally accepted infective origin of acute articular rheumatism—strongly suggest that muscular rheumatism is also due to microbial agencies.

The interesting question now presents itself as to how far the foregoing clinical affinities between these two diseases justify the assumption of some, that fibrositis, or chronic rheumatism, is possibly referable to the same microbic agent as acute articular rheumatism.

Now, it is reasonable to suppose that, were the origin identical, a history of acute articular rheumatism would be much more frequently forthcoming in the subjects of muscular and other types of fibrositis than it actually is. Thus, in our series of cases a previous history of rheumatic fever was only elicited in 8·4 per cent. of individuals—a marked contrast to what obtained in gout, which reached the much higher figure of 28·1 per cent.

Much stress has been laid upon this extraordinary rarity of an antecedent acute articular rheumatism. Indeed, many relying on it are not content with the generally conceded *clinical* distinctness, but in addition would postulate an *essential or etiological* difference. Now, while freely conceding their clinical dissimilarity, we cannot but feel that there are possible fallacies attaching to the further assertion that no etiological relationship between the two disorders exists. This may or may not be true, but it would be well to remember the far-reaching significance of some recent researches by Rosenow.

This observer has shown experimentally that the reason why acute endocarditis largely or exclusively originates in youth is, in all probability, attributable to a mere *anatomical* peculiarity. Thus, working with half-grown and older rabbits, he noted a striking difference in the locality of the lesions produced by streptococcal inoculation. In the immature rodent it induced a typical verrucose *endocarditis* of embolic origin, but in the older animal such a cardiac lesion never followed.

But the further remarkable fact was elicited, that, instead, in the older rabbits the lesions of *myositis* constantly resulted, and were in the same fashion due to arrest of the streptococci in the muscle capillaries. That endocardial lesions do not occur in the mature rabbits is due to this: that in them the fine arterioles that in early life traverse the proximal two-thirds of the cusps have become obliterated. In other words, the valves have become *non-vascular* and so present no facilities for the occurrence of embolism. As to the nature of the lesions produced in the muscles in older animals, these are precisely similar to those characteristic of "rheumatic myositis."

It would be difficult to over-estimate the importance of these findings, and the striking parallel they present in regard to the age incidence of endocarditis and myositis in man. Thus, the penchant of endocarditis for youth is undeniable, and likewise that of muscular rheumatism or myositis for adult and middle life.

Is it not possible, therefore, that the same organism may at different periods of our life-history find in different modes its clinical expression ?—in youth assuming the guise of acute articular rheumatism or endocarditis, and in later decades masquerading under the form of muscular rheumatism or fibrositis. Far-fetched as it appears at first sight, the assumption gathers probability from the results of recent bacteriological researches.

Thus, Rosenow, while conducting his interesting investigations into the cultural and pathological characteristics of the streptococcus, noted that these undergo *mutation* on variation of the culture medium, and likewise following serial animal inoculation.

Experimenting with different strains produced by these methods, he was able to establish individual affinities on their part for different structures. Thus, some displayed a predilection for the joints, others for the heart valves; others, again, for the muscles; and, what is most striking, that this individual affinity on their part for affecting particular tissues is not merely accidental, but constant.

NOTE.—Using special media, Rosenow isolated from inflamed ("rheumatic") joints three types of organisms, with which he produced typical arthritis in rabbits, obtaining also pure cultures from the rodents' joints. Of these the *Streptococcus viridans* displayed special affinity for the endocardium, the *Streptococcus hæmolyticus* for the joints, and but little for the endocardium, while the remaining organism, a diplococcus (indistinguishable from a pneumococcus), initiated not only endocarditis and arthritis, but also myocarditis and a *myositis*. By varying his media he could at will transmute these three types into one another.

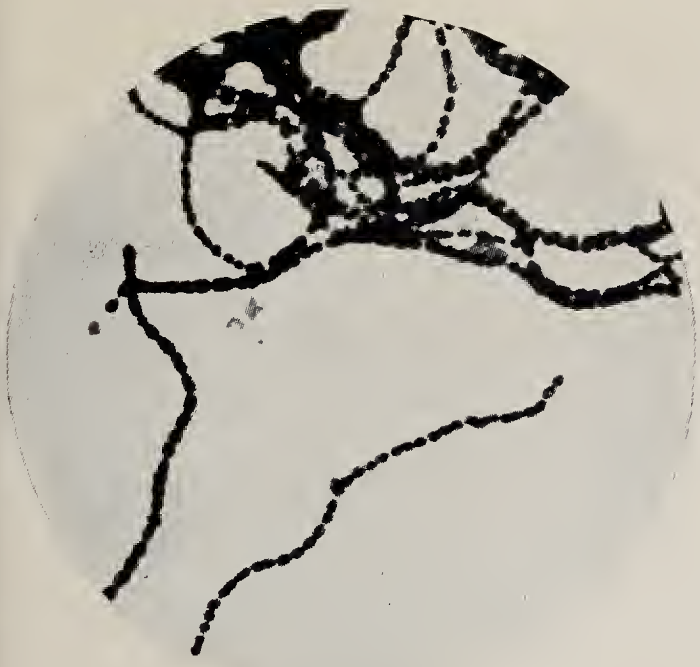


FIG. 1.—Streptococcus from a case of rheumatism, showing long chains and green pigment. Streak from a sediment of a twenty-four hours' ascites-dextrose-bouillon culture. Capsular stain.

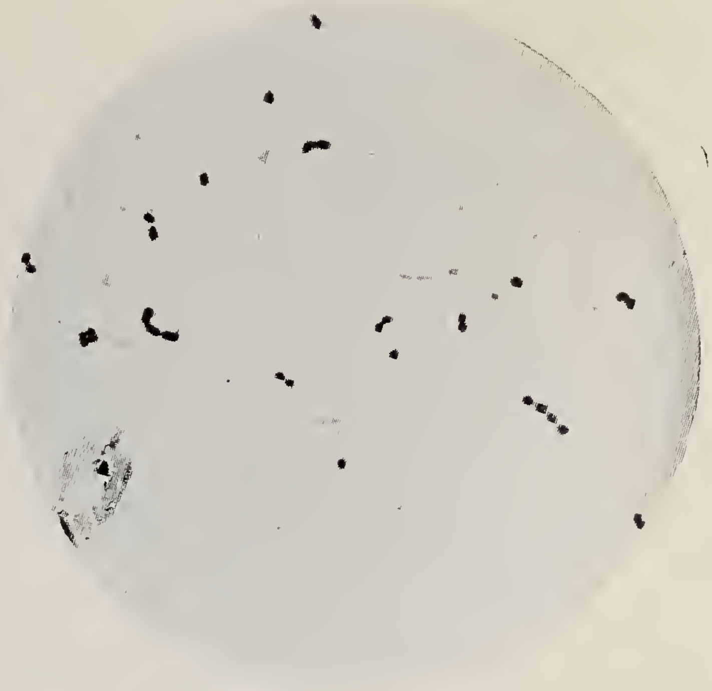


FIG. 2.—Strain of *Streptococcus rheumaticus*, showing slight hæmolysis on blood agar, which gave rise to myositis in animal experiments. Streak from a blood agar stab culture, capsular stain.

(By kind permission of Professor Rosenow of Chicago.)

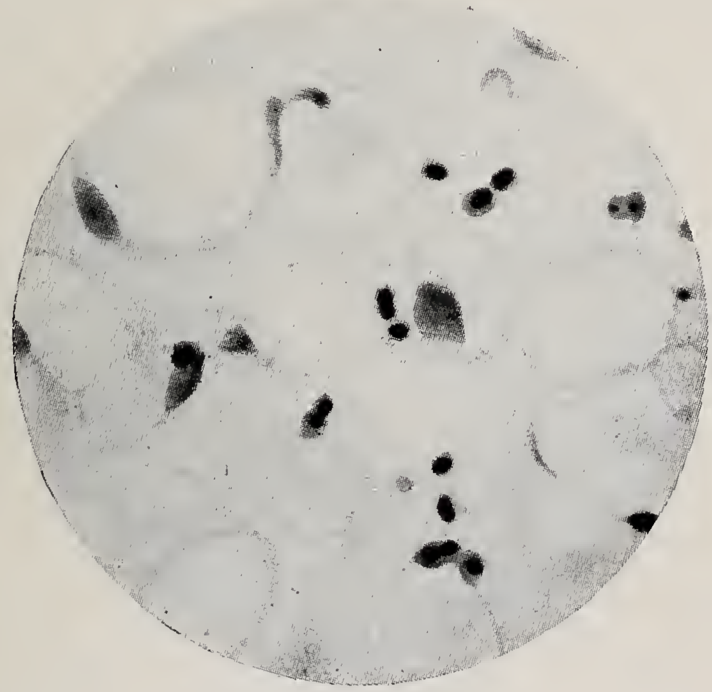


FIG. 3.—The same strain as in Fig. 2 after its transformation into a pneumococcus. Streak from a blood agar stab culture.

(By kind permission of Professor Rosenow of Chicago.)

To face page 36.

This susceptibility to mutation of the streptococcus by culture variation or serial animal inoculation is obviously of arresting interest, and incidentally suggests the possibility that such a transmutation may occur in man at the actual site of focal streptococcal lesions. In this way might be explained the varying clinical manifestations of chronic rheumatism: why in some the joints, in others the muscles, are predominantly affected.

In conclusion, in the light of this overlapping of their *clinical* features and that shed by experimental findings, surely, to deny unconditionally the very possibility of any *etiological* relationship between acute and chronic rheumatism seems rash and unwarrantable.

To withhold judgment were the wiser part, for closer clinical observation may haply reveal a still more frequent trenching of acute articular rheumatism on the territory of the acute muscular types, and a similar predilection on the part of the latter to appropriate characters deemed peculiar to the former.

For definite enlightenment of this vexed question we must perforce tarry, pending the identification of the *causal organism or organisms of acute articular rheumatism;* but, when placed beyond the reach of cavil, we venture to believe that some specific connection between them and the various types of chronic rheumatism or fibrositis will yet be found.

Reasoning by analogy, too, the frequency with which *influenza* and *gonorrhœa* may be complicated by myalgias and myositides materially enhances the probability of such an assumption. For that genuine influenza, as Stockman says, may be followed by fibrous thickenings of severe and widespread character is undoubtedly true, and we ourselves in private as opposed to hospital cases have frequently found it cited as a cause, more particularly in instances of brachial fibrositis or deltoid rheumatism.

Adami has recently suggested that the muscular aches and pains, and the subsequent fibroses met with in this condition, are due to *embolic obstruction* of the capillaries by the influenza bacillus.

Again, it would be folly to overlook the proclivity of the gonococcus for the fibrous tissues, for almost certainly even in the most carefully compiled series of examples of fibrositis this infection often passes unrecognized. For the muscular

---

The organisms under certain conditions are non-pathogenic; thus in the oral cavity they are innocuous unless located in the tonsillar crypts or in a deep decayed tooth socket. In these latter sites they grow, as Rosenow terms it, under a low oxygen pressure, and so develop pathogenicity, as is also the case when the organisms are situated in the vesiculæ seminales. The virulence of some of these microbes is enhanced by exposure to *cold*, which throws a sidelight on the *modus operandi* of this factor in favouring the onset of "rheumatism" in joints, muscles, and elsewhere.

pains and stiffness associated with it are indistinguishable from those of muscular rheumatism, and likewise the muscular nodules or infiltrations frequently found in this association. In one example recorded by Ware, which we believe to be unique, a condition of gonorrhœal arthritis of the shoulder was associated with fibrositis of the neighbouring muscles, in whose substance the gonococcus was detected *in situ.*

Lastly, in a few isolated instances of our own series, a history of syphilis was forthcoming, and the possibility of such a taint being present should not be lost sight of.

For it must be remembered that interstitial myositis is very common in syphilis, and the lesions produced being very similar to those met with in muscular fibrositis, confusion may result.

Neuralgic Types.—In some cases, too, of this group the mode of onset may be strikingly sudden, and especially is this true of *sciatica*, in which there may be considerable febrile disturbance.

These "rheumatic" neuralgias and neuritides, like the corresponding myalgias and myositides, display the greatest diversity in intensity and duration—differences presumably attributable to the varying character of the causal organism, the resisting powers of the individual, and other contributory factors.

Their infective nature is also attested by the frequency with which such manifestations accompany or arise in sequence to maladies of specific infective nature.

It is almost certain that an *idiopathic brachialgia or sciatica does not exist*, and that in most instances it is but the expression, often terminal, of an infection.

How frequently is there forthcoming an account of a recent *influenza*, and what, we fear, is very commonly overlooked—the presence of a urethral discharge of *gonococcal* nature, not only in sciatica, but also in brachialgia ! If to this be added Fournier's emphatic claim that syphilis is much under-estimated in its frequency as the cause of such neuralgias, we see how increasingly loth we must be in assigning to these disorders a gouty or "rheumatic" origin. That not only infections of the genito-urinary organs, but also of the *intestinal* canal, may be the original cause of sciatica or other forms of neuritis is shown by the increasing number of instances reported after *dysentery* and *enteric fever*.

In this way we may see how strong is the probability that these so-called "rheumatic" neuralgias are attributable to infection.

Doubtless in the fulness of time, with the increased powers of differentiation now available, the number of so-called "gouty" and "rheumatic" neuralgias will be strikingly diminished, comparably with what has already taken place in regard to the articular and other manifestations of chronic rheumatism.

In drawing to a close our analysis and comparison of the varied symptomatology of so-called "chronic rheumatism" with the equally diverse features of the specific infective arthritides, one inference may surely be drawn—viz., the presumptive evidence in favour of their common infective origin is extremely cogent.

It now remains for us to ascertain to what extent this plausible assumption is supported by clinical, bacteriological, and experimental observations.

Associated Clinical Phenomena suggestive of the Infective Origin of Chronic Rheumatism.

There are many peculiarities in the general appearance and life-history of so-called "rheumatic" individuals which seem to indicate the existence of some constitutional anomaly.

Even when, as often happens, they are outwardly robust, they seem unduly prone to functional derangements, are wont to perspire profusely, and prove markedly susceptible to atmospheric disturbances, while their urine not infrequently deposits an excess of lithates.

Whatever be the connection between the two series of phenomena, there is no doubt that such persons are especially liable to be attacked by rheumatism or fibrositis; or, in the words of the older physicians, they possess a "rheumatic" diathesis.

That some inborn peculiarity attaches to these individuals seems clearly indicated by the fact that they so swiftly and constantly react to atmospheric and other environmental influences, but to which other persons, though placed in precisely the same circumstances, remain indifferent.

This, we would suggest, is the outcome of some inherent or static proclivity on the part of the fibrous tissues to toxic susceptibility with a tendency to hyperplasia of the connective-tissue elements.

In some cases of more marked nature there are distinct *objective* evidences of the existence of a toxic state of the blood-plasma, or what many prefer to term an "autotoxæmia." Thus, very commonly they present a sallow complexion, are somewhat wasted in appearance, and complain much of headache, lassitude, mental irritability, and often depression of almost pathological degree. Their skin, too, is frequently altered in texture, splashed with pigment or marked with papules ; the perspiration is either foul-smelling and excessive, or the cutaneous excretion deficient.

Commonly, too, they suffer from cold feet and hands, and many in our experience present symptoms clinically indistinguishable from true Raynaud's disease; while occasionally enlargement or decrease in size of the thyroid gland is noticeable.

The bodily temperature is more often than not subnormal. and with it is frequently associated unusually low blood-pressure, though in regard to this latter the variation or alternation of raised and lowered arterial tension is the more characteristic.

Deficient tone of the general musculature is in marked cases very obvious, and betokened often by a sagging abdomen, as well as by the readiness with which a state of painful fatigue is induced.

So much for the general aspect and symptomatology of mild and the more severe cases of "chronic rheumatism," and it now remains for us to ascertain what indications there are of the site of the original focus of toxic absorption, or, as we should prefer to term it, "subinfection."

Gastro-Intestinal Derangements.—It is a matter of common experience that "rheumatic" pains are often preceded by or associated with flatulence, heartburn, and other symptoms indicative of deranged gastric or intestinal digestion.

Indeed, to our mind there is little doubt that, if the primary onset of all cases of fibrositis were more narrowly investigated, it would be found that the subjects, though often considering themselves in perfect health, had for some time prior to the full development of the attack experienced symptoms clearly denoting functional disorder.

Nothing is more certain, too, than that exacerbations or relapses of fibrositis are very commonly preceded by symptoms of gastro-intestinal or hepatic disorder. Thus, how frequently in practice do we see persons, previously immune, suddenly fall a prey to the affection on changing their mode of living, more especially in respect of diet!

Many years ago, in his work on "Diseases in the Army," Sir John Pringle arrived at the significant conclusion that it is not during the actual progress of a campaign that soldiers are more prone to develop rheumatic ailments, but on their return to garrison life. That this should be so appears at first sight somewhat singular, having regard to the privations and atmospheric vicissitudes inseparable from active military service.

But, as against this, it is obvious that the change from a vigorous life in the field to the close confinement in the barracks would be most calculated to produce a temporary derangement of their general health.

Certainly, experience of the disorder as met with in civil life favours this supposition, and, moreover, indicates clearly that the functional disturbance most commonly originates in the gastro-intestinal tract.

How well established is it that these subjects after unusual, though not necessarily excessive, indulgence at the table almost inevitably suffer from diffuse aching and stiffness in their fibrous tissues!

Veterinary authorities have also noted the same swift response to dietetic indiscretions, gastro-enteric catarrh very frequently preceding attacks or exacerbations of muscular rheumatism in horses, dogs, cattle, etc.

Of equal significance, too, both in men and animals, is the certainty with which freedom from such manifestations is attained by abstinence from or more moderate indulgence in articles of diet predisposing to such outbreaks.

So much by way of prelude as to the probability attested by clinical observation and the results of treatment that the alimentary canal is usually the source of the responsible microbe or toxin.

It now devolves upon us to consider what more exact evidence there is of infection or toxic absorption in the alimentary canal or elsewhere.

Local Foci of Toxic Absorption.—With conspicuous frequency the subjects of fibrositis are found to suffer from *tonsillitis, pharyngitis, oral sepsis, pyorrhœa alveolaris,* or *post-nasal catarrh.*

Thus, acute attacks of generalized or local fibrositis are often preceded by a sore throat, and undoubtedly such are frequently not only the direct cause of the initial outbreak, but recurrences of the same initiate relapses or exacerbations.

This is true indifferently of arthritic, muscular, or nerve manifestations of fibrositis, and it is at least interesting to note that *bursitis,* more especially the subacromial type, often directly follows such tonsillar or pharyngeal inflammation; while in this connection, too, it is significant that involvement of this bursa occurs with suspicious frequency in association with post-scarlatinal rheumatism.

In other cases of more insidious development, pyorrhœa alveolaris or infective states of the nose or its accessory cavities are present, and the results of treatment seem to indicate that infection or toxic absorption takes place from these sites.

Dental caries, too, is extraordinarily common in these patients, and by many it is thought that the organisms pass directly into the blood-stream, and effect a lodgment in the affected structures.

In support of such direct infection of the implicated tissues we have the fact that the gonococcus, with its marked proclivity for fibrous tissues, has been found in myositis of the shoulder muscles (Ware), while Codman asserts that it is by no means an infrequent cause of subacromial bursitis.

Diminution or Absence of Free HCl.—As opposed to this direct transference of the micro-organisms by the blood-stream, others, discussing the causal relationship of *dental caries* to fibrositis, believe that it acts indirectly.

Now, this condition, as we know, is due to the action of anaerobic organisms, which find a suitable nidus for their growth in the particles of food lodged in or between the teeth.

The gastric juice of normal acidity is quite capable of dealing with moderate quantities of pathogenic bacteria, but in the presence of oral sepsis it is probable that a greater number are swallowed than can be satisfactorily coped with.

In the same way relative insufficiency of free HCl will favour the growth of anaerobes which have gained an entrance to the subject, and incidentally increases the chance of such bacteria reaching the intestine, where they promote putrefaction.

Apart from relative insufficiency, an analysis of the stomach contents after a test meal has revealed in a small proportion of cases *an absence of free HCl.* In this case, the defensive barrier of free HCl being drawn, there is lacking the necessary inhibition of microbic growth. The diminished acidity also, in permitting the passage into the intestine of ill-digested proteid substances, favours their subsequent putrefaction.

Excess of HCl.—Symptoms of chronic gastric irritation, the penalty of overindulgence in food and sedentary habits, are frequently present in the subjects of fibrositis.

Friedburger and Frohner, too, have remarked that a predisposition to rheumatism often develops in pampered dogs too highly fed or too little exercised.

This gastric hyperchlorhydria, though more common in those subjects of fibrositis who present gouty stigmata, in our experience is by no means confined to them.

The symptoms referred to the stomach are weight, fulness, and oppression in the epigastrium, accompanied by distension and acid eructations.

Graham Chambers, from examination of the stomach contents in patients suffering from "muscular rheumatism," found that in the majority of instances there was present a condition of *hyperchlorhydria.*

Clinically one notes in these subjects that excessive and rich feeding, and even moderate use of alcoholic stimulants, invariably aggravate their tendency to recurring attacks of fibrositis, while dietetic modifications with equal certainty diminish the frequency of incidence. Unfortunately, the pernicious effects of hyperchlorhydria are accentuated by the fact that intestinal indigestion ensues secondarily, owing to the acid chyme completely antagonizing pancreatic secretion, and thus impairing digestive capacity.

Intestinal Indigestion.—This condition may arise from a variety of causes—improper food, excess or deficiency of gastric juice, defective motility, and diminished secretion of intestinal juices.

The clinical features presented are very variable, and it is difficult, if not impossible, in any given instance to decide how far the symptoms are referable to intestinal stasis or constipation, or to a chronic infection with a resulting catarrhal state of the mucosa, or to both causes combined in varying proportions.

But be the explanation what it may, there is no question that the most common antecedent or accompaniment of fibrositis is *intestinal derangement.*

The *symptoms* in slight cases consist of recurring bouts of indigestion; the appetite may or may not be impaired, the tongue may be clean or coated, while the breath gives forth a sour odour, and an unpleasant taste in the mouth is complained of; but in either case pain and distension appear from one to four hours after food, and often temporarily relieved by the intake thereof. Coincidently they frequently complain of drowsiness, headache, or neuralgia in the temporal region.

Often, on inspection of the abdomen in the erect posture, one is struck by its altered contour, and the sagging and protuberance of its lower half—an indication of the deficient tone of the general musculature and of *visceroptosis.*

The site of pain is frequently over the right iliac fossa and ascending colon, and on palpation there may be areas of tenderness, with unusual splashing sounds, such as one meets with in dilatation of the bowel and enteroptosis.

Occasionally visible peristalsis can be observed, which of course may be indicative of pericolic bands, whose importance in producing defective motility of the bowel we are only now beginning to appreciate.

Almost always there is a history of prolonged *constipation,* which it is well to remember may be compatible with a daily evacuation. It frequently alternates with diarrhœa, or the fæces are foul-smelling and often contain excess of mucus; while the reaction is alkaline, and their content of organisms may be greatly increased.

The secondary consequences of such intestinal derangements are far-reaching, especially if the small bowel be involved, a catarrhal state of which may lead to reduction in the secretion of bile and pancreatic juice.

How frequently in these cases do we find symptoms indicative of sluggishness on the part of the hepatic functions, such as turbidity of the urine and a pale or abnormally dark colour of the alvine evacuations, the outcome of inability on the part of the liver to deal satisfactorily with the substances conveyed to it from the gastro-intestinal tract!

Now, as a mere glance will show, reduction and impairment of biliary and pancreatic secretion have far-reaching consequences.

Foodstuffs undergo abnormal changes, are less easily absorbed, and simultaneously chemical products are formed, which irritate the intestinal mucosa. Nor do the baneful effects cease here, for in consequence of the unusual nature and reaction of the intestinal contents the bacterial flora in the bowel undergo changes.

Thus organisms, normally present only in small numbers in the small intestine, find the altered medium more suitable for their growth and multiplication; while others, whose usual habitat is the large bowel, migrate upwards, and infect the ileum and duodenum, and ultimately the biliary and pancreatic passages.

In the presence of such deficiency in the intestinal juices proteins are imperfectly digested, and putrefaction under microbic action favoured. At the same time the digestion of carbohydrates is impaired, organic acids are formed, and gases in larger amounts liberated. Ultimately, owing to absorption of these irritating products, a condition of chronic toxæmia results.

Urinary Changes.—The alterations that ensue in the reaction of urine in these cases of fibrositis associated with gastro-intestinal derangement are of importance, inasmuch as they supply us with some indications for treatment. There is no constancy in the findings, and sharp differences obtain in the observations of different observers.

Thus, in the majority of instances the urine is high-coloured, extremely acid, with a copious deposit of lithates. In another group, the subjects of which are frankly neurasthenic, the urine is pale, very slightly acid, neutral, or definitely alkaline, with an excess of phosphates. In our experience excess of oxalates is not uncommon, and is often at the root of obscure forms of backache erroneously classed as lumbago.

Occasionally there is present an excess of indican, though opinion sharply differs as to its significance; but it is at least worth noting that the readily induced fatigue, torpor, and neurasthenia, so often complained of by these subjects, are very similar to those experimentally produced by Herter in men and animals by the administration of indol—a product of excessive intestinal putrefaction.

Apropos of the variations in urinary acidity in fibrositis, some researches by Brown published in the *Johns Hopkins Hospital Bulletin* are worthy of a digression. He dealt with well-defined types of *neuralgia*, *neuritis*, and *muscular fibrositis*. His series comprised 44 cases, classified as follows: 5 neuritis, 2 sciatica, 8 neuralgia, 11 neuralgic headache, 5 lumbago, 1 torticollis, 23 myalgia, by this latter term being understood "diffuse pain affecting certain muscles or groups of muscles, probably due to certain changes in their fibrous constituents."

Careful study of the etiology in the author's opinion excluded the influence of hereditary predisposition, dietetic indiscretion, or exposure to cold and trauma. The salient product of his research was the demonstration, by a most careful procedure, of the constant association of *increased urinary acidity.*

Collectively the result obtained was that, after bringing the respective urines to a specific gravity of 1015, they gave an average urinary acidity of 51·5. Now, under normal conditions, in a subject passing 1,500 c.c. of urine daily, with an average specific gravity of 1015, the usual acidity is 25, or thereabouts, expressed in terms of decinormal sodium hydroxide solution.

These findings demonstrate that, although the tendency for these cases is to have a higher specific gravity than normal, yet there is nevertheless a real and considerable increase in the acidity, the average as above shown being a little more than double the normal.

Relationship of Urinary to Gastric Acidity.—In endeavouring to ascertain the why and wherefore of this hyperacidity, the author sought to discover whether it bore any relation to the acidity of the gastric juice. Test meals were given in 9 out of 44 cases, the results of whose analysis were compared with that of a specimen of urine obtained at the same time. Of the 9, 3 had no free HCl, in 3 the free HCl was between 20 and 40, and in 3 between 49 and 60.

The free hydrochloric acid ranged from 0 to 59, the total acid from 15 to 76, these, like the urine, being expressed in terms of decinormal sodium hydroxide solution.

The urinary acidity in the 9 instances varied from 49 to 138, or (corrected to a specific gravity of 1015) from 31·9 to 76·6.

The author considers that the cases examined in this manner, though few in number, yet, as far as they go, seem to indicate an absence of any relationship between the gastric and urinary acidity.

His ultimate conclusion was that the urinary hyperacidity was either due to disturbance in the functions of certain hepatic and intestinal ferments, or that the cases might be considered as of the nature of *atypical gouty manifestations,* or evidences of a lithæmic tendency.

Urinary Hypo-Acidity.—In contradistinction to the foregoing findings, Edgecombe of Harrogate holds that in his experience the acidity of the urine in these subjects is almost always below normal, and contains large quantities of phosphates. He attributes the hypo-acidity to deficiency of free HCl in the gastric juice, and contrasts these findings with those of gout, in which the acidity is above normal.

Personally we are disinclined to subscribe wholly to either of these opposing views as to the universal hyperacidity or hypo-acidity of the urine in fibrositis.

A substantial number of these cases are, as we have pointed out, the subjects of definite gout, and doubtless this diathesis casts its impress on the acidity of the urine; while in others, lacking this taint, the urine for some obscure reason becomes diminished in acidity.

Positive Bacteriological Data in Favour of Infective Origin.

Now, as we have seen, these individuals suffer very frequently with oral sepsis, pyorrhœa alveolaris, dental caries, post-nasal catarrh, or other localized foci of infection.

Moreover, we have ourselves observed a most striking amelioration, and even cure, of arthritic and muscular types of chronic rheumatism follow radical treatment of the diseased foci. The swiftness with which we have seen such disappear after the removal of carious teeth or the effectual treatment of nasal and aural discharges suggests very strongly that these sites were the original foci of infection.

The good results, also, which follow in many instances the systematic irrigation of the colon after the Plombières technique seem to carry a similar inference—viz., that toxic or microbic products in the intestine are thereby removed, and their absorption obviated or checked.

Moreover, we have the fact attested by many, that, following the treatment of such by autogenous vaccines, a marked improvement of their so-called " rheumatic " symptoms sometimes ensues. This response would seem to indicate some causal connection, and, influenced by it, Goadby and others have in a limited number of cases instituted a systematic bacteriological examination, not only of the local foci, when present, but also of the urine, and in some cases of the fæces.

The identity of the causal organisms was determined by the character of the response to the following tests:

1. The phagocytic and opsonic reaction of the patient's serum to the isolated organism.
2. The effect upon the symptoms of the inoculation of autogenous vaccines.

3. The lesions noted in animals as the result of inoculation with such organisms.

Those which gave a low phagocytic and opsonic index, and in addition agglutinated the patient's serum, were used in the first instance, and of these organisms those most in evidence were streptococci, streptobacillus, and *Bacillus microdentalis.*

Vaccines were prepared with the organisms—one very similar to the *microdentalis*—and their inoculation was followed by a temperature reaction and subsequent improvement of the *articular* swellings and other symptoms.

In addition to the foregoing, Goadby has collected a number of cases of chronic rheumatism or fibrositis involving *muscles, tendons, and nerve sheaths.* These were also treated with vaccines prepared from the urine of the subjects. The inoculations were followed by exacerbations of the symptoms, with rise of temperature, and ultimately by improvement and in some instances actual disappearance of the symptoms complained of.

We ourselves have noted the presence of coliform bacilli in the urine, and Buckley from similar observations is inclined to attach to them a causal significance. Now, the foregoing bacteriological researches, though few in number, seem clearly to indicate that, given routine investigation along these lines, an increasing number of these "rheumatic" or undifferentiated arthritides will be found linked up with infective lesions either in the mouth, with its accessory cavities, or in the lower levels of the alimentary canal, or in the genito-urinary passages.

But, despite the fact that radical treatment of such foci and administration of autogenous vaccines cultivated from their site afford strong presumptive proof of an etiological relationship, we have still to ascertain whether the anatomical lesions in joint, muscle, or nerve, are due to the actual presence *in situ* of germs, or to the action of toxins generated at the original site of microbic infection.

Examination of Joint Fluids.—Now, it must be admitted that hitherto all recorded observations made on the joint fluids in these undifferentiated types have failed to disclose the presence of organisms.

Munro and Almond, working at the Royal Mineral Water Hospital, Bath, found that, of fifty fluids examined, taken from forty-six patients representing all forms of chronic arthritis, including undifferentiated types, organisms were doubtfully present in one or two smears only. In no case were cultures obtained in all of the four control tubes, and only in four cases were cultures obtainable in two or more of the four.

Cytology of Joint Fluids.—Munro and Almond subjected to cytological examination over thirty of the fluids above referred to.

The leucocyte count was found to range from under 1,000 to 40,000 cells per cubic millimetre.

Of these, the polymorphonuclear count varied from 100 to 3,800, with one exception, and the lymphocytes and mononuclears varied from 350 to 7,600.

The cases comprised rheumatoid arthritis, gonorrhœal arthritis, subacute articular rheumatism, and *infective arthritis of undifferentiated type.*

No characteristic differentiation was to be observed; in other words, on a cytological basis all these various types of arthritis have an equal claim to be regarded as of infective origin.

Latent Infection.—In endeavouring to elucidate the etiology of these obscure types of chronic arthritis, one of us, as a result of discussion with Dr. Munro, the senior pathologist, decided to institute in the wards at the Royal Mineral Water Hospital, Bath, a routine examination of all such cases by the *old tuberculin* test, and also by Fleming's modification of the *Wassermann* test.

Originally it was customary to divide chronic arthritis into two main groups—*tubercular* and *non-tubercular*—but more modern research seems to indicate that even this broad classification cannot be accepted without reservation. In other words, it would appear from the researches of Poncet and his pupils that, apart from the familiar *tumeur blanche*, there are particular types of arthritis attributable to an attenuated variety of tuberculous infection (*le pseudo-rhumatisme tuberculeux*).

Poncet claimed that these types of chronic synovitis and arthritis were due either to tubercle bacilli or to tuberculo-toxins without actual intervention of the organisms.

Not only may *joint* troubles ensue, but also *myalgias* and *neuralgias*, and so we see that the triad of lesions typical of chronic rheumatism is also here represented.

This is another point in favour of the infective origin of *chronic rheumatism,* under which term—in this country, at any rate—no doubt some of Poncet's types pass unrecognized.

One essential point to be grasped is that such tuberculous forms of rheumatism are but seldom primary, and usually appear as secondary to some other focus, pulmonary or otherwise, of which infection they represent, as it were, the extension.

The possibility of a latent *syphilitic* infection being present in some of these undifferentiated varieties of chronic arthritis has often been canvassed.

The appended results directed to elucidate this obscure point seem to indicate that such a specific taint is not infrequently present, though whether any etiological significance attaches to its presence must be left for future decision.

Incidence of the Tuberculous and Syphilitic Infections in Cases of Multi-Articular Arthritis of Indeterminate Causation, and in Sciatica.

At the time of reporting, sixty-three cases of arthritis and seven of sciatica have been subjected to diagnostic hypodermic inoculations of Koch's tuberculin (O.T.), and simultaneously opportunity has been taken of subjecting the blood-serum to Fleming's modification of the Wassermann test.

The tuberculin test in this form was selected as being less open to objection than the conjunctival reaction of Calmette, the cutaneous reaction of Pirquet and Moro, or the variation of opsonic index test. It has also the advantage of being in universal use in veterinary practice, where the results have been controlled by post-mortem observations.

In this series the maximum dose for inoculation has been $\frac{1}{250}$ c.c. O.T. Having ascertained that the patient had a normal temperature, $\frac{1}{1000}$ c.c. was given as a first inoculation, and a rise of 1° F. or more within forty-eight hours taken as a positive result.

Failing this, a second inoculation of $\frac{1}{500}$ c.c. was given, and, if this produced no rise, a third and final inoculation of $\frac{1}{250}$ c.c. was given after a few days. It is evident that, in purposely limiting the test to three inoculations and to comparatively small doses, we obtain a lesser number of positive reactions than would be the case if the test were pushed farther.

Fleming's modification of the Wassermann test, as used in this series, had been previously employed by Dr. Munro in several hundred cases of eye disease reported on to the Clinical Society of Bath, as well as in numerous other known syphilitic and para-syphilitic cases, the result leaving no doubt of its reliability in a statistical investigation like the present. The commonest cause of failure or ambiguity is lack of complement in the blood examined. All such cases (not exceeding five in seventy) have been classed as negative in calculating the percentage of positive reactions, so that the latter must be, if anything, understated.

The "hospital" diagnosis of the cases selected may be arranged in the following classes:

"Rheumatoid" arthritis	30
Osteo-arthritis	13
Undifferentiated types of infective arthritis	20
Sciatica	7
	70

4

If the "reported diagnosis on admission" were taken as a basis for compiling the above table, the numbers would differ considerably. For instance, the cases of "rheumatoid" would number nineteen only, and the remainder would fall under one or other of the following designations: "rheumatism," "chronic rheumatism," or "rheumatic arthritis"—in other words, the *infective arthritis of undifferentiated type.*

A brief summary of the results is given in the following table:

	Tuberculin Reactions.			Wassermann-Fleming Reactions.			Positive to Both Tests.	Negative to Both Tests.	Negative to One or Other Test.
	Positive.	Negative and Doubtful.	Total.	Positive.	Negative and Doubtful.	Total.			
Rheumatoid arthritis ..	17	13	30	7	23	30	3	11	16
Osteo-arthritis	3	10	13	2	11	13	1	7	5
Undifferentiated types of infective arthritis	13	7	20	4	16	20	3	5	12
Sciatica ..	3	4	7	4	3	7	1	1	5
	36	34	70	17	53	70	8	24	38
Per cent. of total	51·4	48·5	—	24·3	75·7	—	11·4	34·3	54·3

The question whether the 24 per cent. of positive Wassermann-Fleming reactions is of more significance than a measure of the incidence of active syphilitic taint in hospital patients must be left for future discussion, when more complete data will be available.

Of the 36 patients showing positive tuberculin reactions, 21 reacted at the first inoculation, 12 at the second, and only 3 required the third.

Of the 34 patients not reacting to the tuberculin test, it must be noted that, either from objection taken or want of opportunity, 9 received the first inoculation only, and 9 only two inoculations. Had the full number been given, it is probable that several more positive reactions would have been obtained.

All of the patients had, of course, been examined on admission for recognizable tuberculous, gonorrhœal, or syphilitic lesions. and the cases reacting positively were thoroughly examined and their previous personal and family history investigated.

In two cases antecedent tuberculous troubles (axillary abscess thirteen years previous, and scraping operation on the tarsus some months previous) were disclosed.

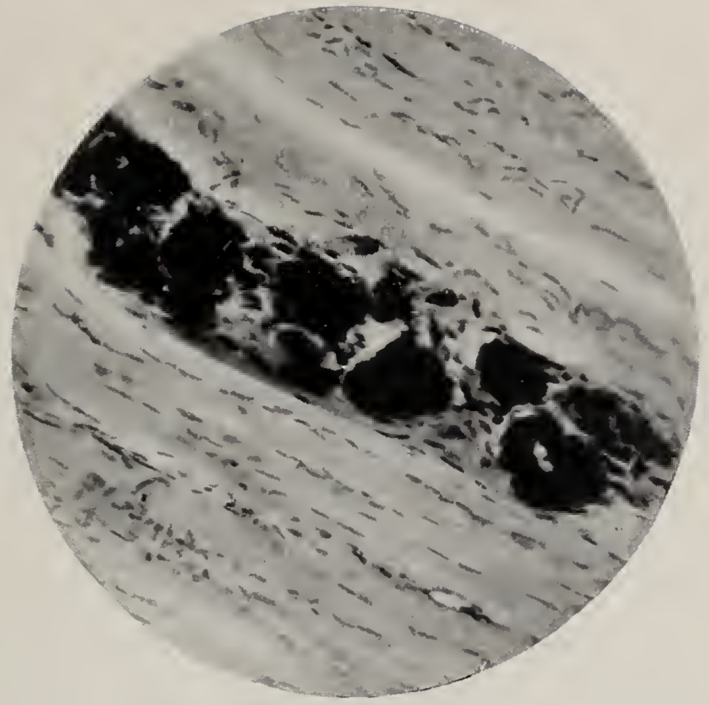


FIG. 4.—Experimental rheumatic myositis in dog. Micro-photograph of longitudinal section of lesion in muscle two weeks after injection of a streptococcus, showing affinity for the muscles. (× 230.)

(By kind permission of Professor Rosenow of Chicago.)

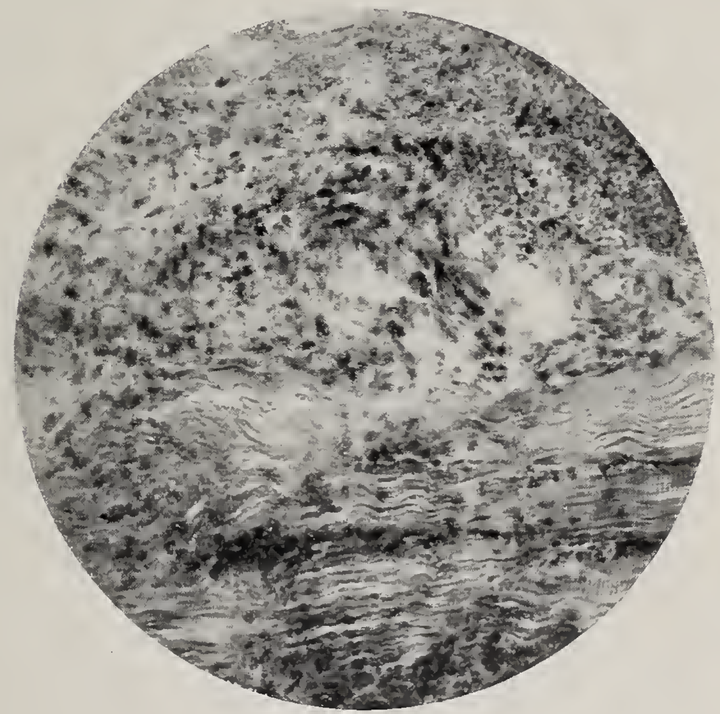


FIG. 5.—Rheumatic myositis in man. Micro-photograph of human (biceps) muscle, showing marked degeneration of muscular fibres, leucocytic infiltration, and hæmorrhage. Frozen section. Hæmatoxylin and eosin. (× 230.)

(By kind permission of Professor Rosenow of Chicago.)

The conclusion seems inevitable—unless the validity of the test as made be altogether denied—that the high percentage (51·4) of these cases reacting positively to tuberculin does not merely reveal an *accidental* coincidence, but points to the existence of a factor of the arthritic trouble which cannot be disregarded in etiological discussion.

The cases form part of a series which will be discussed at length elsewhere.

Experimental Data in Support of Infective Origin of the Lesions in Chronic Rheumatism.

In the course of the researches before alluded to, Goadby noted that the incriminated bacteria, when inoculated into animals, showed but little virulence.

The chief change noted was, in brief, the gradual formation of fibrous tissue, this being unattended by suppuration.

Injected into the vicinity of joints, a very pronounced degree of *periarticular fibrous hyperplasia* resulted, and similar lesions followed their introduction simultaneously in the neighbourhood of muscles.

The fibrous overgrowths were in many instances of persistent character, and it was observed that identical proliferative changes in the connective tissue developed in parts remote from the site of inoculation.

As a rule after ten days it was impossible to detect the organism *in situ*, and attempts, moreover, at culture proved sterile; but where the lesions were more enduring the organisms could be isolated even as late as three weeks afterwards.

In the light of these researches, it would appear that the responsible organisms have but a *fleeting* existence, and, judged by them, it is clear that, if positive results are to be looked for, the bacteriological investigations must be conducted at the onset of the initial joint disorder or other manifestation.

The most conclusive researches regarding so-called "rheumatic" lesions and their production by microbic agents are those which have recently emanated from Rosenow of Chicago. During his interesting study on the development of streptococcal strains, and the different lesions produced by them, he found that he was able by inoculation to induce in rabbits with certainty the typical lesions of "rheumatic" myositis.

By examination of the lesions at different periods of their development, he ascertained that initially they were due to the *arrest of streptococci of a particular grade of attenuation in the muscle capillaries.* The organisms for a few hours undergo proliferation, and in sequence to this the muscle fibres in the neighbourhood of the embolism pass into a state of necrosis.

The limited multiplication of the organisms now ceases, and they disappear, undergoing lysis apparently as soon as the tissues react. With the decease of the organisms their endotoxins are set free, and destruction of the more highly differentiated cells in their vicinity ensues, and this *without pus formation.*

Ultimately, in favourable cases, the *restitutio ad integrum* follows, but otherwise the necrosed structures are replaced by fibrous tissues, or even a productive fibrositis.

Apart from the fact that Rosenow was able to produce these lesions with remarkable constancy, it is worthy of note that they displayed a striking predilection for the *tendinous* attachments of muscles—a favourite site in man for myositic nodules.

The early disappearance of the organisms by lysis readily explains why, in instances where muscular rheumatism has assumed an epidemic form, the staining of excised portions of muscles has disclosed no evidence of bacteria.

Lastly, Rosenow was able not only to identify these animal lesions with those of *rheumatic myositis* in man, but also to establish their infective origin. Thus in one of his papers he narrates the instance of a man who after an attack suffered with severe muscular manifestations—one a very definite lesion in the biceps.

A cross-section of the muscles disclosed relatively normal striation, with round-cell infiltration and hæmorrhages, the whole constituting a definite " rheumatic " nodule. Moreover, the organisms cultivated from this same area, when inoculated, reproduced myositic lesions in a rabbit, and subsequently the organism was again isolated from that same animal.

We see, therefore, that, in the light of these as well as Goadby's experimental researches, the typical periarticular infiltration as well as the myositic lesions characteristic of muscular rheumatism can be produced by the direct local intervention of organisms, and, reasoning by analogy, it seems highly probable that these same agents may infect the *nerve sheaths*, and be at the root of a so-called " rheumatic " brachialgia or sciatica.

Survey of the Preceding Sections.

In attempting to appraise the significance of the data, *clinical bacteriological*, and *experimental*, as outlined in the previous pages, it will, we think, be more convenient to deal consecutively with the subject from several aspects.

We have drawn attention to the frequent association of gastro-intestinal disorders, and this of course opens up the question as to whether or no the varied symptomatology of chronic rheumatism or fibrositis is explicable on the basis of an autotoxæmia of gastro-intestinal origin.

To a discussion of this we shall now proceed, and subsequently shall pass on to consider whether this or the theory of subinfection sheds most light on the etiology.

Are the Symptoms of Chronic Rheumatism explicable by an Auto-toxæmia of Gastro-Intestinal Origin ?

The frequency with which gastro-intestinal derangements figure in the life-history of these subjects is widely held to constitute strong presumptive evidence that their existence predisposes to or is responsible for the production of fibrositis.

Thus Telling, who has devoted much attention to the subject, states that in his opinion disturbances in the alimentary tract, oral sepsis, flatulent dyspepsia, play an important etiological rôle. This opinion is also shared by others of wide experience, such as Bain and Edgecombe, likewise Buckley, who attaches some etiological significance to the mucous colitis that is sometimes present. This conception of a gastro-intestinal toxæmia as the originating cause derives colour also from the cogency with which Gowers, Garrod, and others maintain gout to be a factor.

The view, however, has not passed unchallenged, for the deductions drawn from clinical experience hitherto remain unconfirmed by experimental findings. The revelations, indeed, forthcoming at the recent discussion on *alimentary toxæmia* have been distinctly chastening in regard of our somewhat glib use of the term in our wish to account for the genesis of this and other disorders.

Thus Adami has roundly stated that the phrase "gastro-intestinal autotoxæmia," as commonly used, "should and must be banished from the vocabulary of every self-respecting man."

Scathing as such an indictment truly is, yet it must be candidly confessed that, subjected to the touchstone of experimental proof, the retention of the term is difficult to justify.

Speaking precisely, there is no certain evidence that the symptoms generally attributed to autotoxæmia are referable to substances generated from the foodstuffs under the action of the digestive juices.

Toxic as are peptones and primary proteoses when they gain direct access to the tissues, the symptoms produced in no way resemble those affiliated to alimentary toxæmia, but rather, according to Adami, approximate to those typical of anaphylactic shock.

Normally, too, it would appear that the mucous membrane proves an efficient barrier to their entry, these poisonous bodies during their passage through it becoming transmuted into innocuous substances.

Nor can we refer the symptoms of toxæmia due to intestinal stasis or other causes to the later and terminal products of protein disintegration, for seemingly these cleavage products become progressively less toxic on their downward path to effete matter.

The diamines, too, produced by bacterial action on foodstuffs, putrescin and cadaverin, are forthcoming in such minimal amounts as to be insignificant, while the toxic influence of cholin and neurin still remains unestablished.

Of one product only of protein disintegration—viz., indol—is there direct experimental proof of its toxic qualities; but the symptoms noted by Herter to follow its ingestion—headache, irritability, muscular fatigue—though they sometimes occur in fibrositis associated with constipation, cannot be causally linked up with the anatomical lesions of this affection.

Therefore, those who, like ourselves, attach great etiological importance to constipation in fibrositis have to face the disconcerting fact that indol and skatol are with difficulty absorbed from the healthy colon.

Moreover, the researches of Woolley and Newburgh demonstrate that even long-continued injections of indol and tyrosin lead only to minimal anatomical changes.

The same barrenness has attended experimental researches on carbohydrate and fatty disintegration, while there is no evidence that the anaerobes present in the digestive tract produce ectotoxins or undergo lysis with release and absorption of their endotoxins.

In short, it is but too clear from the foregoing brief résumé of recent experimental findings that the positive data on which our conception of auto-intoxication has been built up are, if not absolutely wanting, all too slender to establish its validity.

Having dealt with this aspect of the question, we shall now pass on to consider whether the features of chronic rheumatism can be more adequately explained on a basis of infection or subinfection.

Evidence in Favour of Chronic Rheumatism being of Infective Origin.

A review of the data contained in previous sections is, it must be admitted, strongly in favour of such a conception of its etiology.

On the clinical side the most significant features are furnished by the *acute types of muscular rheumatism,* though, as we saw, they are not wanting also in the arthritic and even in the neuralgic varieties of fibrositis.

In this connection the *blending or overlapping of the symptoms of acute muscular and acute articular rheumatism* has not, we think, attracted the attention its importance merits.

For, accepting the view that acute articular rheumatism is of infective nature, such mutual trenching of the one disorder on the clinical territory of the other is strongly indicative of a like etiological affinity—a similar if not identical microbic origin. More direct evidence, of course, of the connection of fibrositis with a specific germ is forthcoming as regards the *gonococcus,* as, apart from its presence and articular lesions, it has been detected by Ware *in situ* in gonorrhœal myositis.

Nor must we forget the striking instance of *rheumatic myositis* cited by Rosenow, in which the organisms cultivated from the lesion, when inoculated, induced identical muscular lesions in a rabbit.

We have, again, the fact strongly upheld by Stockman and others that *influenza* is an efficient cause of fibrositis, and also that recrudescences or even primary attacks of the disorder follow tonsillitis and other forms of sore throat.

Now, while doubtless gonococcal and influenzal infections intrude their influence into the most carefully compiled series of chronic rheumatism, it is clear that they can at best account for only a minority, but the similarity of the clinical features of the undifferentiated types is such as to suggest a kindred origin.

Albeit, having regard to the relatively slight degree of constitutional disturbance, the presumption is that in the majority of instances of fibrositis the causal microbes, *whether of streptococcal or other kinds, are of attenuated virulence.* On such a view their etiology might be explicable as the outcome of one form or other of chronic infection, or, as Adami prefers to call it, subinfection.

This hypothesis of *subinfection* derives a considerable measure of support from the clinical as well as from the experimental side, and to appreciate its cogency a brief digression regarding this doctrine is essential.

Theory of Subinfection.

Some years ago Adami and his co-workers established the fact that even in normal animals the alimentary and respiratory tracts, also the liver and kidneys, constantly afford cultures of pathogenic and non-pathogenic bacteria. Moreover, that such organisms through the agency of leucocytes continually pass into the system, where subsequently in the healthy animal they as constantly undergo destruction.

If, however, inflammatory processes are at work, a corresponding modification ensues. For under these abnormal conditions a more prominent aggregation of leucocytes takes place at the site of the inflammatory focus, and concurrently, their migration being more active, larger numbers of bacteria achieve an entry into the system. The subsequent course of events is determined by the number and virulence of the bacteria that effect a lodgment in the tissues, where under favourable circumstances they originate other foci of infection or subinfection.

By *subinfection* is understood the fact that the bacteria carried into the system undergo but *slight if any numerical increase*, and they *do not set up foci of suppuration.*

Instead of multiplying they undergo lysis, and their endotoxins being released, the more highly specialized tissue cells in the neighbourhood are destroyed. But simultaneously it is interesting to note that the lower-grade connective-tissue elements are by the self-same poisons stimulated to proliferate, and an area of *chronic interstitial fibrosis* is formed.

Fourteen years after promulgating this hypothesis, Adami in a critical survey notes with satisfaction the cumulative growth of evidence in favour of his assumption, and the allied view as to the frequency of latent infection. Thus he reminds his readers that in young animals fed orally by tuberculous and other bacilli, these organisms can be detected in the lymph of the thoracic duct within an hour or two. This experimental fact is, as he points out, of profound significance, if in its light we recollect that in adolescents of eighteen years of age a positive reaction to tuberculo-cutaneous tests is attained in 95 per cent. of those inoculated. Of these, only 10 per cent. succumb, while in the remaining 85 per cent. the disease undergoes arrest and assumes a latent form.

The importance from our point of view is the direct experimental proof that not only tubercle, but streptococci and other organisms, taken orally, can gain an entrance into the system.

Apropos of this latent tuberculous taint, it will be recollected that in a previous section we showed how frequently in chronic arthritis a positive reaction to inoculation with old tuberculin was forthcoming.

As to what the actual significance, if any, of this response to tubercle may be is of course uncertain, but it does at least lend plausibility to Poncet's assumption that there is a chronic tuberculous rheumatism.

Incidentally, too, we cannot overlook the fact already ascertained that many of the subjects of so-called "chronic rheumatism" react positively to Wassermann's test.

Also we may add that many astute observers have often queried whether an acquired or hereditary syphilitic taint may not be a contributory etiological factor in the genesis of certain of these undifferentiated arthritides, commonly classed as "chronic rheumatism."

It is a singular fact, too, from the therapeutic side that the drugs most in use for the relief of these types of chronic articular rheumatism are the iodides, and that sagacious old physician, Fuller, laid no small stress on the efficiency of mercurials also in their treatment.

But leaving *sub judice* the significance of such latent tuberculous and syphilitic infection in these cases, we would revert to the question of *subinfection or chronic infection from the alimentary tract.* Upon this basis we get a clearer conception of the relationship of fibrositis or chronic rheumatism to local foci of infection.

Thus, whether it be a condition of oral sepsis, pyorrhœa alveolaris, post-nasal catarrh, intestinal disorders, constipation, and so forth, we see that it is highly probable that the organisms at these sites of infection gain access to the blood-stream, with subsequent establishment of local lesions in muscles, joints, or other structures.

The often prolonged course, too, of fibrositis and its marked tendency to recurrences or exacerbations would be explicable as the outcome of a continued or intermittent series of subinfections.

As Adami pointed out, the chief anatomical change noted was the gradual formation of fibrous tissue unattended with suppuration, and it is worthy of note that this is the precise characteristic of the lesions induced by Goadby following the injection into animals of streptococci from the urine of subjects of chronic rheumatism, and also those induced by Rosenow working with streptococci of attenuated virulence.

Such a process of continued subinfection would satisfactorily account for the varied character of the lesions, both muscular and arthritic, as well as the subcutaneous fibrous nodules and the different degrees of development presented by these in one and the same individual.

In other words, the objective phenomena of chronic rheumatism can be generally regarded as foci of *chronic interstitial fibrosis* of either local or widespread character.

Apart from the local lesions, the general symptoms of chronic rheumatism usually referred to a toxic state of the blood-plasma seem also to admit of a similar explanation.

For, as the researches of Adami, Charlton, Blackader, and others have shown, the recurrent inoculation in sublethal doses of *Bacillus coli* or streptococci will suffice to produce the general phenomena associated with advanced cases of chronic rheumatism.

Thus the anæmia and sallow appearance of these patients, so commonly the victims of intestinal disorders and stasis, may possibly be explained by the fact observed by Charlton, that recurrent inoculation of sublethal doses of the above-mentioned germs induces hæmolysis and liberation of blood-pigment in the circulation, also loss of fat and wasting of muscles.

The papules and pimples that disfigure their skin may, as Adami suggests, like the rose spots of typhoid, be attributable to embolic lodgment of bacteria in the capillaries.

The mental irritability and torpor so common in the subjects of chronic rheumatism associated with constipation may, as Herter pointed out, be due to absorption of indol.

In conclusion, therefore, it cannot be gainsaid that there is a significant amount of clinical and experimental evidence in favour of the direct causation of chronic rheumatism (fibrositis) by infection.

Theories of Autotoxæmia and Subinfection not necessarily Incompatible.

We have now summarized the evidence that can be adduced in favour of autotoxæmia on the one hand, and subinfection on the other.

The almost total lack of experimental proof in support of the former has led many, notably Adami, to claim that the symptoms are more rationally explicable as being the consequence of subinfection rather than the outcome of chronic intoxication.

To bring into sharp opposition these two views seems neither necessary nor desirable, lest, having escaped from bondage to the word "auto-intoxication," we pass under the thrall of the term "subinfection." Fascinating as is the vista opened up by the theory of subinfection, it would, we think, be unwise to allow ourselves to be obsessed into overlooking the evidence afforded us by clinical instinct and experience.

The laboratory worker no more than the clinical physician is immune from obsessions, and is apt to forget that experiments *in vitro* are but poor imitations of living processes. Even admitting that at present no correlation has been established between the symptoms of alimentary toxæmia and the chemical substances or bacterial toxins hitherto isolated, is it not possible that such deficiencies may before long be made good ?

The bodily tissues doubtless take cognizance of substances which may transcend the subtlest tests of the biochemist, and how easily may the most potent agents elude detection !

To cite an analogy which, though perhaps a little far-fetched, well illustrates our point. But a short time since chemical analysis of the so-called "indifferent" thermal springs failed utterly to vindicate their vaunted efficacy, and yet within a brief span these "indifferent" waters were found to contain a substance—"radium"—whose powers few at present pretend to gauge or limit.

By comparison, is it not even more likely that the infinitely more complex mechanisms of bodily metabolism may give birth to bodies equally potent and no less ephemeral or elusive ?

But to return to the essence of our contention, that the hypothesis of auto-intoxication has been unnecessarily divorced from or regarded as incompatible with the intimately allied pathological process of subinfection. Thus, in regard of the latter, it has before been pointed out that disordered or inflammatory states of the alimentary tract, whether focal or diffuse, favour the entry into the system of organisms.

Is it not reasonable therefore, we ask, to suppose that the functional derangements which so commonly precede or accompany fibrositis may modify the character of the intestinal flora, and promote their migration inwards in greater number ? The inevitable swiftness with which recurrences or exacerbations of this disorder follow even venial dietetic indiscretions distinctly favours this assumption, one, moreover, substantiated by the amelioration or immunity which follows abstention from the offending foodstuffs.

We would submit then that, though at present there exists no experimental justification for attributing the symptoms of fibrositis to toxins absorbed from the alimentary canal, there is no doubt that disordered secretions or defective motility of the same tract favour the occurrence of subinfection.

In other words, while admitting the cogency of the evidence that the direct intervention of microbes seems necessary for the production of the actual lesions of fibrositis, yet the liability to such is enhanced or promoted by the functional derangements which so constantly mark the course of the disease.

Summary of Etiological Factors.

1. Fibrositis is rare in the early, common in the middle and later decades of life, and predominates in the *male* sex.

2. Ancestral or acquired *gout* is relatively common in these subjects, and the presence of this taint strongly predisposes to the development of fibrositis.

3. Even in the absence of definite gouty proclivities, the subjects of fibrositis usually belong to the category of persons who are unduly prone to functional derangements. In addition, they are wont to perspire profusely, are markedly susceptible to atmospheric vicissitudes, while their urine is very commonly extremely acid.

4. A minority of the cases can be directly affiliated, in all probability, to specific infections, notably *influenza. Gonococcal* infection, too, is certainly frequently overlooked, and often accounts, we believe, for cases of otherwise obscure origin, while the possibility of tuberculous or syphilitic taints, for like reasons, must always be borne in mind.

5. The majority of cases of fibrositis are marked by the presence of *local foci of infection* in the mouth or its accessory cavities, or, failing this, by gastro-intestinal disorders, notably constipation.

6. There is a suggestive amount of evidence that the arthritic, muscular, and even the nerve lesions, in most cases of fibrositis, are the outcome of *subinfection by organisms of attenuated virulence* which have gained an entry into the tissues at one or other of these sites.

7. That clinical and bacteriological findings, also treatment by autogenous vaccines and the results of inoculation in animals, supply cogent proof that the anatomical lesions of chronic rheumatism are due to the direct action of organisms *in situ.*

8. That in the presence of gastro-intestinal defects, whether secretory or motor, the pathological activities of the intestinal flora are accentuated and the processes of subinfection promoted.

CHAPTER III

GENERAL ETIOLOGY: DETERMINING OR EXCITING CAUSES

In the foregoing sections we have endeavoured to deal with the essential or proximate causes of fibrositis, and we have now to consider those influences which determine outbreaks or exacerbations of the disorder.

The mode of action of these exciting agencies will be more clearly understood if we adopt the somewhat arbitrary conception that the morbid process is divisible into two stages.

The first of these may be regarded as the period of development or maturation of the pathological change which takes place in the fibrous elements under the action of one or other of the primary causes of the affection.

During this initial stage the inflammatory exudate into the interstitial fibrous tissues may undergo a complete resolution. On the other hand, it may eventuate in the formation of *nodules or infiltrations,* which mark the passing of the affection from out the sphere of functional derangement into that of organic change.

This fell end once achieved, the inflammatory deposits become a constant source of renewed aching and stiffness under the influence of the various exciting agencies to whose consideration we now proceed, dealing in the first instance with atmospheric conditions.

Atmospheric Influences.

So intimate and well attested is the relationship between " chronic rheumatism " and atmospheric vicissitudes that it may well be said to have passed from the debatable region of Opinion into the sacrosanct domain of Proverb.

Exciting and not Original Causes.—Albeit our empirical belief in the intimacy of the connection has gradually undergone, if not attenuation, at any rate modification, it being now generally conceded that such factors are to be regarded as exciting or determining rather than original or proximate causes. This, too, notwithstanding that sporadic instances crop up from time to time in which the strictest investigation has failed to elicit the intervention of any other known cause.

As to how these meteorological factors exert their action is extremely obscure, and ascertained facts being largely absent, theories are much in evidence.

But while all prevailing views are, by reason of our limitations, very speculative, still certain observations in regard to states of weather and the incidence of fibrositis are well worth a brief digression.

Exposure to Cold.—In the first place, the comparative immunity from "rheumatism" enjoyed by Arctic explorers seems to indicate clearly that cold, even of the greatest intensity, is insufficient of itself to evoke "rheumatic" symptoms.

Thus, Captain Parry, in his account of "A Voyage for the Discovery of a North-West Passage," comments on the extreme rarity with which "rheumatic" pains were experienced during the expedition. Baron Larrey also, in his "Mémoires de Chirurgie Militaire," observes that the same happy immunity obtained amongst the French soldiers even throughout the horrors of Napoleon's ill-fated Russian campaign.

Exposure to Wet.—But if this be true of intense cold, it is no less certain that *mere exposure to wet* is likewise inadequate to produce this disorder, for is it not a matter of familiar knowledge that "rheumatic" pains frequently diminish, or even disappear, when a spell of rainy weather has actually set in?

Combined Wet and Cold.—All agree, however, that a combination of cold and rainy weather—in other words, a *low temperature combined with humidity of atmosphere*—is much more uniformly provocative of attacks.

Moreover, it is not essential that the subject should be within the area of rainfall; indeed, if only he be within the outer limit of the prevailing climatic disturbance, it is sufficient to excite the appearance or exacerbation of "rheumatic" pains. The foregoing observation is quite in keeping with everyday experience, for it is notorious that these persons are, to use the expressive French phrase, *très barométrique.*

This sensitiveness to impending climatic disturbances has attained to almost diagnostic significance, and one is reminded of Swift's old couplet, the general truth of which few would gainsay:

> "A coming shower your shooting corns presage,
> Old *aches* throb, your hollow tooth will rage."

This assumption of their causal connection is, of course, very ancient, antedating by many years any knowledge of our power of estimating variations in atmospheric pressure. Naturally, therefore, having regard to the widespread belief in "damp" as a cause of rheumatism, it seemed to the older physicians highly probable that "rheumatic" persons would be more sensitive to impending rain, and the absence of any other known factor, of course, fostered the belief.

But while it is often true that the rheumatic joint or muscle like "the pricking corn foretells the gath'ring rain," it is by no means infallible, for frequently, as we know, no rain ensues to verify the prediction.

Moreover, this discrepancy is supported by Longstreth's observations, which show that no constant relationship can be established between the incidence of the pains and the hygrometric findings. Indeed, he found that the "rheumatic symptoms often develop prior to an increase, either actual or relative, of the moisture content of the air"—an observation the truth of which from our own experience we can confirm.

It is obvious, therefore, that the influence of some other and more constant factor capable of inducing or aggravating "rheumatic" pains must be at work.

Variations in Barometric Pressure.—As we all know, the imminence of a storm is usually foreshadowed by a fall in barometric pressure, and we are inclined to believe that such alterations in atmospheric tension play a part in the production of the so-called "prophetic pains."

Moreover—and we would lay stress on this point—it is not mere extremes, either high or low, of barometric pressure, but, rather, *rapid oscillations in atmospheric tension*, which seem more intimately associated with the production of these pains.

But, nevertheless, of the two conditions, a rising or a falling barometer, the latter is more uniformly accompanied or preceded by pains than the former. This we would attribute to the fact that atmospheric depressions often occur more abruptly, while elevations usually develop gradually, and so adaptation of the organism to the environmental change is attained with less disturbance.

The peculiarity, too, that pains are less in evidence during states of high pressure is probably in part due to the fact that the circulation under such circumstances is carried on more effectually, thereby lessening the chance of the retention, and hastening the excretion of toxic and irritating products.

Our contention that the incidence of rheumatic pains is dependent upon atmospheric pressure, more especially sudden or rapid alternations, is supported, we consider, by the following analogy with *Caisson Disease:*

Thus, as we are all aware, severe arthritic and muscular pains are apt to ensue in caisson workers if subjected to too rapid *decompression*—in other words, to too sudden changes in the pressure to which they are exposed.

Some observations, too, of Miller, who has devoted much study to this subject, are worthy of allusion. He found that the premonitions of so-called "prophetic" joints frequently go hand in hand with a falling barometer, but not invariably so. Thus, for instance, if the wind were in the *north* or the *east*, these ominous tokens might be associated with a rising atmospheric pressure. He concluded, therefore, that the pains could not be ascribed solely to a lowering of barometric pressure, but inclined to believe them due to the *co-operation of the two factors, "cold" and "damp."* But for us the influence of barometric pressure cannot, for the reasons before stated, be so cursorily dismissed, if we bear in mind the hypersensitive, irritable state of these "rheumatic" joints and muscles. Their structure permeated to a greater or less extent by new fibrous overgrowth, it is only reasonable to suppose that they adapt themselves less easily than healthy textures, and consequently respond painfully to the variations in tension associated with changes in atmospheric pressure. We are the more disposed to refer their abnormal sensitiveness to this increased fibrous tissue formation, inasmuch as we see the same swift and inevitable response in cases of traumatic fibrositis, old dislocations of the shoulder, and so forth—conditions all of them characterized by fibrous hyperplasia.

Radio-Activity of Atmosphere.—According to Grabley, the periodic variations that mark gouty and rheumatic pains, and usually ascribed to weather changes, are really attributable to variations in the radio-active content of the atmosphere. During his investigations of this obscure subject he established the fact that the emanation capacity of the atmosphere about the time of the full moon is peculiarly high, the same, however, subsiding towards the period of the new moon.

Coincidently he noted that the critical days—those on which especially severe pains were experienced—recurred almost regularly at the time when a *high capacity of the air in radium emanation* was demonstrable.

Read in the light of the foregoing experiments, the following lines perchance contain the kernel of a scientific truth:

"Therefore the moon, the governess of floods,
Pale in her anger, washes all the air,
That rheumatic diseases do abound."
Midsummer Night's Dream.

Again, according to Steffens, meteorological observations show that in summer the content of the air in negative ions is proportionately much higher than in positive ions, while in winter the reverse holds good.

The same is true in regard to individual days; thus great warmth in the presence of little vapour or fog is accompanied by marked ionization of the air, with predominance of negative over positive ions.

On the contrary, a low temperature, with abundant mist and vapour, is attended by diminished ionization, more especially in regard to negative ions.

Under the former meteorological conditions, Steffens observed that pains of a rheumatic nature were distinctly lessened, but in the latter were aggravated.

That rheumatic pains should diminish in the presence of a relatively much higher content of the air in negative ions is supported by the belief that the beneficial effect of radio-active baths depends—at least, in part—on their richness, as compared with the atmosphere, in the more penetrating and more actively physiological negative ions or beta rays.

Steffens and Grabley, reasoning on the foregoing data, consider, therefore, that a certain percentage of radio-active ions in the air is absolutely necessary for gouty and rheumatic patients.

In this connection we may mention that Gottlieb and others assert that, owing to the inhalation of emanation in the galleries of St. Joachimsthal pitchblende mines, where the air is radio-active, gout, rheumatism, and neuralgia do not occur.

Should these interesting observations be confirmed, they would, indeed, constitute a striking object-lesson, for, as our records show, workers in *coal*, as opposed to pitchblende mines, are especially prone to suffer from the various forms of chronic rheumatism or fibrositis.

Saake also, from investigations carried out in the mountainous regions of Arosa, concludes that the radio-activity of the air is of deep import to the human organism, and it is possible that the beneficial results that follow the transference of rheumatic patients to dry, sunny localities of high or moderate altitude may be attributable in some measure to the greater radio-active qualities of mountain air.

Winds.—Rapid changes of the surrounding air, either in its amount of warmth or in its movement by winds and draughts, especially increase the liability to " rheumatic " manifestations.

Thus variations from intense heat to cold draughts probably account in part for their frequency in stokers on ocean-going steamers and those engaged in firing steam boilers on land. The same conditions, doubtless, are responsible for their occurrence in bakers, laundresses, and so forth. As Dr. Gregory in his lectures observes: "It is probably not without reason that the genial south and west winds have alone been invoked with praise by poets." In accordance with the old saying, "Eurum neque homini neque bestiæ propitium esse," it is the *east* wind that is usually credited as being most conducive to the development of rheumatism.

Of all forms in which cold acts upon the body, *a wet fog in combination with a penetrating east or north wind* appears to us to be most certainly injurious. Equally noticeable is the marked amelioration in rheumatic pains that ensues when the wind veers round from the east to a south or south-westerly quarter.

As to why the north and east winds should be more pernicious than the southerly or western is uncertain, but it must be remembered that the effect of air in movement (wind) on evaporation is very marked.

Thus a cold east or north-easterly wind, if dry, augments evaporation, and so reduces the temperature of the body by the impact of its cold particles, which absorb the heat and then pass away, to be replaced by a fresh stratum of cold air.

Under such circumstances, as we are all aware, the skin becomes unpleasantly dry and chapped, and the lungs are irritated.

It is possible, therefore, that the revulsive effects on the skin of such unfavourable atmospheric influences in some individuals throw too great a strain on their powers of physiological readjustment, inducing in this way a variable degree of auto-intoxication.

In the foregoing sections we have considered seriatim the various weather changes, which, having regard to their relationship to climate, may wisely be recapitulated.

Provisionally we arrive at the following conclusions:

1. That a *combination of cold, wet, and windy weather* is more provocative of rheumatism than any of these factors acting singly.
2. That *rapid oscillations* rather than merely low or high readings in barometric pressure in some obscure way favour the appearance of "rheumatic" pains.
3. That *northerly or easterly* winds are more pernicious than southerly or westerly.
4. That *diminished ionization of the air*, more especially in regard to negative ions, also favours rheumatic affections, such a condition being usually allied with a low temperature and abundant mist or vapour.

5. That in regard to the foregoing weather and barometric changes, the more *sudden* their occurrence, the more noticeable are the physiological effects produced.

Climate.

The climate of a place may be said to be the average condition of the atmosphere, while weather denotes a single episode or event in the series of conditions which make up a climate.

Having regard, therefore, to our summary of the weather changes, it will be seen that variableness of climate has more influence than either extreme heat or cold; the swifter and more erratic the change, the more pronounced will be its *physiological* action.

Consequently, we find that so-called " chronic rheumatic affections " cannot be said to be the prevailing disease in either very warm or very cold countries.

Chomel long since said that rheumatism was rare either at the Poles or at the Equator, but prevalent throughout the Temperate Zone, and especially in humid or marshy districts.

That it is not entirely a matter of latitude is shown by the great difference in incidence of the disease in districts of the same country. Such discrepancies, moreover, obtain in regard to places which in the matter of climate and exposure are practically identical.

It seems obvious, therefore, that other factors are concerned, and there is much reason to believe that *relative differences in soil* concur in augmenting or decreasing the liability of the inhabitants to " rheumatic " manifestations; but to the influence of this factor we shall allude in a coming section.

Variability in climate, as we have seen, is the most provocative, and in keeping with this tendency we find that the most variable months of the year furnish the largest number of cases.

Accordingly, during the summer or warmer portions of the year there are fewer cases, while the spring is more productive than the winter, and the latter than the autumn.

Lastly, in this matter of climate some regard must be had to *individual constitutional peculiarities.*

As we have before remarked, many cases of fibrositis are of gouty habit, and such persons enjoy more freedom from attacks in dry, cold climates, which seem more suitable for those vigorous plethoric people who eat too much.

Doubtless these beneficial effects are attributable to stimulation of tissue change by the low temperature and dryness of the air, these leading to improved digestion, assimilation, and excretion, with increased bodily activity.

On the other hand, many of the subjects of fibrositis are spare feeders, whose powers of digestion and metabolism are deficient, and for them a mild, moderately warm, and not too damp climate seems the most suitable, involving, as it does, less strain upon their powers of adjustment.

Unhygienic Surroundings.

Modern experience has but confirmed ancient beliefs in the pre-eminent influence of unfavourable environment in promoting the development of rheumatic ailments, and in this connection the matter of soil is of paramount importance.

Soil.—The precise rôle played by soil in an etiological respect is too obscure for us to dogmatize on its effects, but study of the phenomena of infective diseases, such as typhoid, diphtheria, and, we may add, acute rheumatism, indicates clearly that there is a very definite relationship.

As we know, Newsholme's researches have shown that the prevalence of rheumatic fever is associated with high soil temperature, low ground water, and a deficient rainfall.

Unfortunately, owing to the lack of any definite evidence of a specific connection between acute and so-called "chronic rheumatism," these data cannot be directly adduced in support of a similar influence in the case of the latter disorder.

But we may, however, rest on the more general statement that the geological features play a less important part in "chronic rheumatism" than *soil dampness.*

The prevalence of the disorder in low-lying alluvial tracts is notorious, and is doubtless in part attributable to the fact that the ground water is either very near the surface, or the soil is water-logged through considerable periods of the year.

Moreover, such a site is subject to fogs, and if, still worse, it borders on a river, it is liable to be flooded, and hence it is difficult to secure dry basements, not to mention efficient drainage.

Clay soils, owing to their impermeability, are apt to be damp from retention of moisture, and are cold, because of their low capacity for absorbing heat.

Even *gravel*, if it possesses a loamy matrix, or is water-logged through low situation and an underlying layer of clay, may also prove damp.

The improvement that follows the transference of rheumatic patients from such unfavourable surroundings to places possessing a pure, dry, and porous soil is both remarkable and convincing.

Our own experience distinctly indicates that in country districts *constant soil moisture* doubtless favours the prevalence of rheumatic disorders, the malady being very common in those who live in marshy neighbourhoods, or whose dwellings abut on rivers, ponds, or large sheets of water.

On the other hand, in case of town dwellers, mere soil moisture is often subsidiary to more potent causes, such as *general sanitary defects.*

In most artisans' and labourers' dwellings, owing to the absence of damp-proof courses, the walls of the ground-floor or basement are very commonly moist.

In consequence of such defective subsoil drainage, not only is the surrounding atmosphere, but even the interior of the house, unavoidably damp.

For the subsoil moisture, as it rises, drives the ground air out, and thus, through evaporation, the surrounding air becomes both damp and cold.

Moreover, through capillary attraction, moisture permeates the walls of the house, evaporates from their internal surface, and during this process, of course, absorption of heat takes place.

The striking prevalence of rheumatic ailments in the lower walks of life is doubtless, we think, to be referred in part to the badly ventilated, ill-drained, or damp houses which but too often are their portion.

For many generations such agencies as prolonged exposure to cold and damp air in bedroom or workshop have been credited with the production of "rheumatism."

Thus, among the poorer classes it is not infrequently attributed to sleeping in a bed abutting on a damp wall, that side of the body which usually lies nearer to it being primarily and often exclusively implicated.

Rheumatism in Animals.—The same class of circumstances undoubtedly, too, favours the development of rheumatism in the lower animals.

Thus hounds, if allowed to sleep in draughty or damp kennels, are predisposed to muscular rheumatism, and all must have noted how often the disorder arises in dogs thoughtlessly encouraged by owners to retrieve objects time after time from cold water.

Sheep, also, if permitted to lie out on intensely cold nights, or after being dipped in ponds, frequently develop the same affection.

Horses and cattle, especially the former, fall frequent victims, and veterinary authorities attach great etiological importance to damp, cold stables, and grazing on wet pastures.

As to the *modus operandi* of such adverse environmental conditions, we would submit our belief that both in man and animals they operate only *indirectly* by lowering the *vis resistantiæ* of the organism, and thus paving the way for its development.

Influence of Occupation.

The relationship of this factor to the development of fibrositis is a matter of some moment, one whose importance to our minds has been under- rather than over-estimated. Indeed, one of the most striking features of the affection is the conspicuous frequency with which those who follow certain callings fall a victim to it.

As a proof of our contention, we shall here interpolate an analysis of the various occupations represented in our series, noting the incidence of the arthritic, muscular, and other forms of fibrositis in the respective callings.

Subsequently we shall pass on to consider this aspect of the question under the following headings:

1. The environmental conditions under which the particular employment is pursued.
2. Whether or no it entails a special liability to contraction of chills.
3. If it involves excessive muscular exertion.
4. Or if it favours a sedentary or indolent habit of life.

Occupations.—Out of the 1,000 examples noted in males, no less than 289 occurred in labourers, while next in order of frequency came miners, from which class 139 were drawn.

Gardeners and farm labourers furnish 97, while 69 were coachmen.

Next in liability came engine-drivers, carpenters, and porters. A considerable number were found amongst blacksmiths, shoemakers, painters, tailors, shop-assistants, and clerks.

Of soldiers and sailors, of each 13 were recorded. Publicans were apparently not more liable than milkmen, 11 only of each coming under notice. Postmen and signalmen, despite their exposed life, contributed only five each; while police constables showed no marked proneness to rheumatic affections, only 8 being admitted.

Because of the extremes of temperature to which they are exposed during their occupation, it is somewhat surprising that only 4 bakers and 2 chefs sought treatment.

Of the residual cases, 10 were schoolboys, and of the others, belonging to miscellaneous trades, in no individual instance did the number exceed 8.

TABLE OF OCCUPATIONS: MEN.

Occupation.	Joint.	Muscles.	Lumbago.	Sciatica.	Total.
Labourers	67	59	29	134	289
Miners	18	15	29	76	138
Gardeners	11	15	21	50	97
Coachmen	19	8	11	31	69
Engine-drivers	16	2	8	12	38
Porters	8	6	4	18	36
Carpenters	6	8	5	16	35
Shop-assistants	7	8	2	6	23
Bootmakers	3	9	4	3	19
Clerks	5	3	2	9	19
Painters	3	5	2	8	18
Blacksmiths	1	2	5	10	18
Tailors	5	3	3	7	18
Soldiers	6	6	—	1	13
Sailors	3	2	1	7	13
Publicans	—	6	1	4	11
Milkmen	3	3	3	2	11
Schoolboys	9	1	—	—	10
Policemen	4	—	—	4	8
Hairdressers	4	2	—	2	8
Moulders	1	3	2	1	7
Caretakers	—	4	—	3	7
Mechanics	7	—	—	—	7
Postmen	2	2	—	1	5
Signalmen	4	—	1	—	5
Bakers	—	—	1	3	4
Chefs	1	1	—	—	2
Miscellaneous	15	10	6	41	72
Total	228	183	140	449	1,000

TABLE OF OCCUPATIONS: WOMEN.

Occupation.	Joints.	Muscles.	Lumbago.	Sciatica.	Total.
Housewives	43	28	4	46	121
Domestic servants	14	10	—	19	43
Nurses	3	5	—	8	16
Dressmakers	7	3	—	1	11
Cooks	2	4	1	1	8
Laundresses	2	4	—	—	6
Housekeepers	2	—	—	4	6
Charwomen	2	2	—	1	5
Companions	2	1	—	1	4
Machinists	—	2	—	—	2
Schoolgirls	2	—	—	—	2
Shop-assistants	—	—	—	1	1
Typist	1	—	—	—	1
Clerk	1	—	—	—	1
Teacher	1	—	—	—	1
Deaconess	—	1	—	—	1
Miscellaneous	8	1	—	12	21
Total	90	61	5	94	250

Of the 250 female patients, 121 were housewives, domestic servants ranking next in frequency, 43 of whom entered the hospital for treatment. Nurses, dressmakers, and machinists accounted for 29; while cooks, housekeepers, laundresses, and charwomen gave a total of 25.

Of the remainder, 21 had no apparent occupation, the residue consisting of isolated examples occurring in typists, clerks, shop-assistants, teachers, and schoolgirls.

Proceeding now to discuss the various types of chronic rheumatism in their respective relation to the different occupations or callings, we note that out of the 1,000 male cases the joints were predominantly affected in 228, while in 183 the muscles chiefly were at fault. Lumbago accounted for 140, and sciatica for 449.

In the 250 female cases, the joints were mainly implicated in 90 instances, the muscles in 61, while 94 were admitted for sciatica, but 5 only suffered from lumbago.

Fibrositis of Joints.—Out of a total of 228 males, arthritic lesions were found to be especially common amongst labourers, miners, coachmen, and gardeners; indeed, they furnish no less than 115, or practically half the series. Of the remainder, engine-drivers, policemen, shop-assistants, mechanics, soldiers, and tailors accounted for 45, 16 of whom followed the first-named calling.

It is worthy of note that 9 examples occurred in schoolboys.

Of the residual number, signalmen, carpenters, porters, clerks, hairdressers, and painters totalled 30, these being distributed in almost equal proportions throughout the classes. The list is completed by 29 examples, consisting of solitary instances occurring in very diverse occupations and trades.

Of the 90 women in whom the joints bore the brunt of the affection, 43 were housewives.

Domestic servants came next with 14, dressmakers 7, nurses 3, while charwomen, cooks, laundresses, housekeepers, schoolgirls, and " companions " furnish each two examples. Of the rest, 8 had no apparent occupation, the list being completed by single cases arising in a teacher, a typist, and a clerk.

Muscular Fibrositis.—Here, again, labourers head the list with 59, followed by colliers and gardeners, with 15 each to their account. Bootmakers, carpenters, coachmen, porters, soldiers, and publicans comprise a total of 43, the average incidence in each class being 7. Of 51 additional examples, 8 were shop-assistants, 5 painters; while of milkmen, clerks, tailors, and moulders, there were 3 each.

Of the residual 22, 14 followed quite different callings, to which may be added 8 cases equally divided amongst blacksmiths, hairdressers, postmen, and engine-drivers.

Of the female sex, 61 were admitted under this heading, out of which total 28 were housewives and 10 domestic servants.

Dressmakers and nurses contributed 8, cooks and laundresses 4 apiece, while 2 instances occurred in charwomen and machinists each, 1 in a companion, and 1 in a deaconess.

Lumbago.—This type of muscular rheumatism again proved notably common in miners, labourers, gardeners, and coachmen, inasmuch as they furnish no less than 90 out of 140 cases, or nearly two-thirds of the series.

Next in order, but with much diminished frequency, came carpenters, blacksmiths, bootmakers, and porters, reaching a total of 18. Of the remaining 32, whose avocations were of very diverse character, in none were there more than 3 of any particular craft admitted.

Of the 5 female cases, 4 occurred in housewives, and 1 in a cook, this representing the total admissions of this disorder in a period of twelve years. It should, however, be mentioned that cases of lumbago complicated by sciatica or joint trouble are not included.

Sciatica.—Of the 449 males admitted for sciatica, by far the greater number, as in lumbago, were drawn from the following classes: Labourers, miners, gardeners, and coachmen, the total number amounting to no less than 291. Porters, carpenters, engine-drivers, and blacksmiths come next in frequency, their number totalling 56; while clerks, painters, tailors, and shop-assistants accounted for 30.

Of the residual number, 72, but 7 occurred in sailors, while 1 only was entered as a soldier. A few isolated instances occurred in publicans, bakers, and plumbers; while of the remaining miscellaneous trades or occupations, in no instance were there over 3 of the same calling who came under observation.

Of the female sex, 94 were admitted suffering from sciatica, of whom 46 were married women.

Of the remainder, 12 were without any settled employment, 19 were drawn from domestic service, 8 were nurses, 4 housekeepers; while isolated instances were met with in a dressmaker, a charwoman, a cook, a shop-assistant, and a companion.

Environmental Circumstances of Occupation.

It cannot be doubted that the conditions, atmospheric and otherwise, under which certain occupations are pursued very materially enhance the liability of predisposed persons to develop fibrositis.

It would, however, be impossible for us to consider in detail all the various callings represented in our series, and so we must perforce confine our attention to those which figure most prominently—*i.e.*, miners, labourers, coachmen, and gardeners.

When we realize that no less than 593 out of a total of 1,000 male subjects of this disorder were employed in one or other of these occupations, the conclusion seems inevitable that the nature of their calling and its environmental contingencies very emphatically favour its development.

Now, it will readily be admitted that of both labourers and miners is demanded unintermitting and arduous muscular toil, the one hewing his living wage out of the grudging bowels of the earth, while the other maybe ploughs his lonely furrow along her stubborn surface.

But while the former in the dim galleries of the mine lacks the invigorating effects of sunshine, he is, on the other hand, withdrawn to a great extent from the adverse influences of wind and rain.

As against this, however, he has often for weeks and months to labour, if not actually in water, at any rate in wet places, and at the same time is frequently called upon to endure extremes of temperature, the atmosphere in the lower levels being often oppressively close, at other times swept by draughts.

It will be seen that the environmental disabilities under which miners and labourers pursue their calling are fairly equally balanced, for the latter, though, like coachmen and gardeners, they may enjoy warmth and sunshine, have nevertheless, like these, to face both wind and weather.

From the point of view, however, of their relationship to "rheumatic" disorders, the important fact we have to grasp is *that the unavoidable vicissitudes of these occupations predispose those following them to contract "colds" or "chills."*

For there is no reason to doubt the generally accepted view that "catching" or "taking" a chill is one of, if not the most common, determining causes of an attack of fibrositis, and a brief digression regarding the mechanism of "chill" therefore will not be out of place.

Production of Chill.

In endeavouring to explain the occurrence of "chill," it will, we venture to think, be conceded that there are three main factors concerned—(1) a low temperature; (2) air in motion; (3) moisture.

The more thoroughly these three conditions co-operate in any given instance, the greater the likelihood of the person exposed to them contracting a "chill."

For under the influence of winds or draughts the air in contact with the skin surface undergoes constant renewal, and consequently, through the cooling of the cutaneous area thus produced, a withdrawal of heat ensues.

Should the skin at the same time be wet with rain or bedewed with sweat, this refrigerating effect will, of course, be reinforced by the process of evaporation.

"Rheumatic" disorders are for these reasons more likely to arise when the weather or environmental circumstances are at one and the same time *cold, wet, windy, or draughty*, while, on the other hand, they are much less prone to occur when one or other of these factors acts alone.

Thus, for example, a labourer, even when exposed during his toil to a low temperature, but rarely falls a victim if rain and wind are absent, and in the same way the miner, given freedom from damp or draughty surroundings, may escape the toll of rheumatism so oft exacted of him.

The gardener or coachman likewise may dig or drive through a broiling midsummer's day under a high wind, and be none the worse; but let the atmosphere be charged with moisture, and lumbago or sciatic pain will likely be his portion.

The foregoing reflections must be qualified, however, by the following reservations:

Failure of Individual Adjustment.—It is not indispensable that these adverse influences should be of marked intensity, for the fault lies often not so much in the subject's surroundings as in the failure of the individual to adjust himself or herself to them.

Thus not uncommonly "rheumatic" pains ensue during warm or still weather, when some part of the body usually protected has been left uncovered. For instance, a woman roused from sleep by a fretful infant may, as a result of exposure during suckling, suffer subsequently from severe "muscular rheumatism" in neck or shoulder.

Neither, for that matter, is it essential that a large area of skin be exposed, as witness the frequency with which a stiff-neck follows the local impingement of a draught, as happens frequently during a railway journey—a striking proof, by the way, of how large a part local agencies play in determining the site of the morbid process.

Again, no marked disparity need obtain between the temperature of the skin and surrounding atmosphere, for it is by no means true that an attack of "rheumatism" is more apt to supervene in such circumstances.

As a matter of fact, the experience of hydrotherapy distinctly negatives this widespread impression, as, unless previously exhausted, profusely perspiring persons may with impunity expose themselves to a cold douche or plunge bath.

In short, it may be said of all these adverse environmental circumstances that their power of inducing a "chill" is *not so much the extremity of the contrast between the body temperature and the surrounding medium, as the length of time during which such harmful influences have been at work.*

In other words, the efficiency of cold and damp as causes of fibrositis will vary in direct proportion to the duration of their action, and the degree of cooling which the body generally, or some particular area of it, undergoes as a result thereof.

Action of Draughts.—On this same basis we apprehend the pernicious effects of draughts to be accounted for, as frequently for a considerable time they pass unperceived by the subject, who but too often is at rest, and at the same time lightly clad.

How commonly does an attack of fibrositis make its first appearance on awaking in the morning, and the explanation in part is that, while buried in sleep, some part of the body is left bare and exposed to damp night air.

Also it must not be forgotten that the body when at rest offers less resistance to cooling agencies than when a brisk circulation prevails as a result of exertion.

Everyone from bitter experience has learnt that sitting in the cold air for a long period is much more likely to produce a "chill" than when active exercise is undergone for the same number of hours under similar conditions.

For under the latter circumstances the vigour of the circulation is maintained, and consequently the skin does not admit of being cooled down to as low a point as when the body is at rest or immersed in sleep.

Certain Types of Fibrositis especially liable to ensue after Chill.—The effectiveness of chill as a determining cause, particularly of muscular types of fibrositis, is one of its most striking features. It is most markedly evidenced in the case of "stiff-neck," and to a lesser extent in lumbago. So much so, indeed, is this the case that one is led instinctively to conclude that there is some anatomical peculiarity in these regions which markedly predisposes to this liability.

In regard of "stiff-neck," we may note that in this region the skin and nuchal muscles are bound together by an unusually dense adherent cellular tissue.

In view of this intimate fusion of the parts, it is probable that the deeper fibro-muscular structures react more swiftly in response to vascular changes in the overlying skin surface.

Again, the blood-supply of this region is comparatively scanty, and the rapidity of tissue change being thereby impeded, the retention or accumulation of waste or toxic products would appear to be favoured. Moreover, clothed and unclothed portions of the body meet at this point—a circumstance which obviously renders it peculiarly open to fluctuations in temperature.

An interesting contrast obtains between torticollis and its analogue in the loins—lumbago—as regards their relationship to chill or exposure. Similar anatomical relations obtain in the cervical and lumbar regions; but while lumbago is invariably of bilateral distribution, stiff-neck is always unilateral.

That this should be true of the latter condition is, we would suggest, attributable to the fact that draughts impinge usually on one side only of the neck.

On the other hand, we would account for the symmetry of lumbago by the fact that in the loins cold can scarcely act on one side more than the other.

Lastly, it may be added that the conditions of clothing as regards the neck are substantially the same in both sexes, hence their equal liability to stiff-neck; but, as opposed to this, the loins in men are much more exposed, hence their greater tendency to suffer from lumbago.

Pathogeny of Chill.

How markedly the natural powers of resistance are lowered by prolonged exposure to cold and wet may be gathered from the results of experimental investigations conducted on certain of the lower animals.

Adami, Fischl, and others have shown that, if through immersion in water animals be reduced to a condition of hypothermia, they become less resistant to infection. Thus chickens—ordinarily very refractory to anthrax germs—readily become infected if allowed to stand in cold water for a considerable period, and the same is true of rabbits in regard to pneumococci and other organisms.

Adami, discussing the *modus operandi* of " chill," maintains that in man, while there may be no question of hypothermia, yet there does occur a contraction of the superficial vessels and congestion of the internal organs. He also asserts his belief that, whatever disorder be the outcome of " chill," the matter is entirely a question of " antibodies and protective mechanisms."

Now, in man certain pathogenic germs are always present in the body, especially in the alimentary tract, and under conditions predisposing to "chill"—physiological resistance being lowered—multiplication of such organisms is promoted, and the chances of their migration into the system augmented.

Moreover, most attacks of fibrositis are preceded or accompanied by a period of functional gastro-intestinal or hepatic derangement, and it is easy to see how this factor, supplemented by the depressing influence of "chill," enhances the possibility of a process of subinfection in the alimentary tract or other focus of infection.

In allotting to "chill" but a subsidiary or indirect rôle in the causation of fibrositis, we are supported by some experiments of Chodomski, who found that, even under conditions most favourable for their effective action, mere "draughts" and so forth were inadequate of themselves to induce an attack of "muscular rheumatism."

We are, therefore, led to the conclusion that "chill" is to be regarded not as an original, but as a *determining or exciting* cause of fibrositis under certain conditions.

Muscular Overaction.

A glance at the various occupations comprised within our series suffices to show that their pursuit in many instances entails continuous and often exhausting bodily exertion on the part of those who adopt them as a means of livelihood.

The bearing of this factor on our subject is obviously intimate when we reflect that—

1. In predisposed persons excessive muscular exercise often occasions an outbreak of fibrositis.
2. The same influence is a fertile source of exacerbations or relapses in those examples characterized by nodules or thickenings.
3. Exposure to cold by augmenting muscular katabolism increases the liability to such.

In endeavouring, therefore, to estimate more exactly the rôle played by unusual or strenuous muscular activity, some brief allusion must be made to the metabolic changes that take place in these structures as a result of overaction.

Excessive Muscular Katabolism.—We are all aware that the muscles of hunted animals—for example, hares—undergo profound changes. Thus their content of extractives is greatly increased, they give a strongly acid reaction, they become pale, flabby, unduly friable, and readily pass into a state of rigor mortis.

In a minor degree it cannot be doubted that the muscular aching and stiffness which follow unlimited or prolonged exercise are due likewise to the retention of the waste products of muscular katabolism.

Legrange has shown that these irksome sensations are accompanied by a copious deposition of urates, this reaching its zenith some three or four hours after the exertion has been undergone.

The muscular aching and stiffness he attributes partly to direct bruising and slight tears of the fibro-muscular tissues, but in the main he believes it to be due to irritation of the muscle substance by retained products, which pass out of the body as urates.

But it may be objected that this mere muscular stiffness which follows a "first day to hounds," or what not, is hardly to be regarded as "rheumatic" in nature, and we would not for a moment suggest that it is.

For such unpleasant consequences usually pass off in a few hours or days, and as the individual gets into training the same amount of exercise induces but a pleasurable sense of fatigue.

Albeit this only holds good of a healthy or at any rate of a *non-rheumatic* subject — a distinction readily appreciated by those who have once been in the grip of fibrositis.

For how frequently in these predisposed persons does some such exertion precede the initial appearance of the malady in the guise of acute lumbago or some other localized form of the disorder!

Moreover, the physical exercise need not necessarily be severe; for it is characteristic of these "rheumatic" subjects that the most banal muscular effort may suffice to determine an attack. Thus it is proverbial that in chronic forms marked by *nodules or thickenings* the taking of even moderate exercise is almost inevitably followed by more or less suffering.

This, moreover, usually begins time after time at the exact site of the inflammatory deposit, and, we may add, herein lies the clue to many oft-recurring bouts of localized fibrositis—to wit, lumbago or deltoid rheumatism.

As to how excessive muscular activity occasions an exacerbation or relapse is somewhat obscure. But in these cases of chronic interstitial myositis with nodules, and possibly secondary atrophy of muscular fibres, it is probable that, apart from impaired contractility, the local circulation, and haply the innervation of the diseased muscle, are somewhat hampered.

This being so, it is only too likely that the effete products of muscular metabolism are but tardily eliminated, and doubtless their retention occasions some irritation. Moreover, we have, in all probability, also an added factor in the shape of minute traumatism or tears of the muscle fibres and capillaries, which would, of course, distinctly favour a local infection by germs through the blood-stream.

That such thickenings or infiltrations are sites of local infection seems supported by the fact that the dispersal of such by vigorous massage is sometimes followed by an attack of acute muscular rheumatism in parts remote. Moreover, we have the experimental as well as clinical fact that organisms have been actually isolated *in situ*, and having regard to the lavish blood-supply and intense and varied metabolism of the muscles, involving elaboration and storage of glycogen, lactic acid, etc., it is not difficult to conceive that under such conditions they might offer a favourable nidus to the growth of organisms.

Influence of Cold on Muscular Katabolism.—A low temperature, entailing as it does a demand for extra heat-production, augments katabolic changes in the muscles, for it must be remembered that these structures constitute " the chief furnace of the body."

We thus see how *arduous bodily toil combined with exposure to cold* increases the tendency to attacks of fibrositis, inasmuch as it favours the development of an autotoxic state, understanding by this an undue retention of muscle katabolites.

Moreover, apart from the fact that, under these circumstances, an increased production of such waste products ensues, we have to reckon with another factor—*i.e.*, that in the presence of a low temperature the ready elimination of these noxious substances is only too likely to be hindered or checked.

This is easily understood when we reflect that strenuous exertion involves as a rule profuse perspiring on the part of the individual, who, unless he maintain the vigour of his circulation at a high level while evaporation is proceeding, runs great risk of contracting a chill.

Now, the cutaneous surface is one of the chief pathways of excretion, not only of water, but also of toxic volatile matter. Should, therefore, this function of the skin be interfered with, the deleterious substances which are being produced in excess are unable to escape along its avenue, and the toxic co-efficient of the blood is consequently raised.

Having regard, therefore, to the frequency with which these adverse influences—*excessive toil and a low temperature, with the associated liability to chill*—were at work in many of our examples, we are inclined to attribute the determination of attacks or exacerbations to the following factors:

1. Imperfect absorption and elimination of the products of excessive muscle katabolism, the retention of such toxic

fatigue-stuffs giving rise to chronic irritation of the fibro-muscular structures.

2. Arduous muscular exertion through the medium of slight tears of the muscles predisposes to local infection, a contingency whose likelihood is enhanced if general bodily resistance has been lowered by a coincident chill.

Insufficient Muscular Exercise.

While fibrositis, judged by our series, is very prone to arise in those following laborious callings, it is by no means confined to them; for we meet it frequently in clerks, tailors, sempstresses, not to mention those in the higher walks of life, who, from necessity or choice, lead sedentary lives.

Indeed, there is no doubt that inadequate, no less than inordinate, muscular activity favours the development of the disorder.

For the muscles, taken as it were *en masse*, constitute nearly half the body-weight, and from the point of view of their metabolic functions rank first among the bodily tissues.

Moreover, apart from the performance of their own intrinsic metabolism, these structures, when duly exercised, contribute not a little to the efficient circulation of blood and lymph, and so promote excretory processes.

We readily see, therefore, that a sedentary or slothful habit of life predisposes to a state of autotoxæmia, and incidentally favours the development of fibrositis.

Excessive Intake of Food.—This tendency to an autotoxic state under such circumstances is greatly aggravated if any excess of carbohydrate or proteid food be consumed.

For this necessarily entails augmented muscle katabolism, inasmuch as it is upon these same structures that the responsibility of disposing of the excessive intake devolves.

Unfortunately, as it happens, persons leading inactive lives frequently consume more food than they can effectually dispose of, and though their muscles when in the full tide of exercise might be well able to cope with the redundant foodstuffs, they are quite unequal to achieving this task when relegated to comparative inactivity.

Apropos of this, Dr. Harry Campbell, in his delightful work "On Treatment," contrasts the metabolic activities of the muscular system in indolent as opposed to more energetic individuals.

Thus he writes: "We shall probably not be far wrong in concluding that the nature of the katabolism in the muscles of our sedentary man is less favourable to health (predisposing to toxæmia, gouty and other) than it would be if he vigorously exercised them."

Elgart, in an interesting communication on this subject, lays great stress on muscular inactivity as predisposing to the affection. He even goes so far as to say that he could produce the characteristic symptoms in any group of muscles that he chose by keeping them inactive for a considerable period, and then using them violently.

Stockman also finds that "rheumatism" is more likely to ensue in city dwellers who take insufficient exercise.

In all probability, too, the penchant displayed by fibrositis of all sorts for the latter decades of life is to be ascribed in part to these factors acting in a predisposed individual—viz., excessive food intake, diminished digestive and excretory capacity, and deficient muscular exercise.

Sir Hermann Weber, commenting on the frequency with which middle-aged individuals of gouty habit develop the several types of the disorder, suggests that this tendency is to be referred often to the inflammatory states of the overnourished (relative overnutrition) connective-tissue elements in and about the muscles and nerves.

The aching and stiffness complained of by the old is doubtless in part the outcome of that bias towards increased fibrous tissue formation associated with senescence. For, partly as a result of local increase in the fibrous elements, and partly in consequence of the general waning of functional efficiency, effete materials are not borne away from the part so swiftly or so surely as of yore, this, of course, prejudicing the nutrition of the muscular fasciculi, and rendering them more susceptible to fatigue and overstrain.

We see, therefore, that, while on the one hand excessive muscular activity often excites or determines outbreaks of fibrositis, on the other "rusting from resting" with overnutrition also favours its development.

But for our comfort we may take it as equally true that adequate and reasonable muscular exercise is, as experience shows, one of the surest means wherewith to combat this tendency. "In medio tutissimus ibis."

Influence of Occupation and Other Factors in localizing the Seat of the Affection.

The localizing influence exerted by occupation and other factors of a traumatic or mechanical nature may be discerned to a certain, though limited, extent in regard of all forms of chronic rheumatism.

Arthritic Types.—In coachmen and labourers, for example, we often find the interphalangeal and knuckle joints primarily and solely affected. Sempstresses, who use their fingers much, find themselves crippled in the hands first; while cooks, who are constantly lifting pots, etc., off the fire are apt to develop the affection in their wrists.

Elsewhere we have emphasized the frequency with which a gouty taint was present in our series, and it is at least worthy of note that the site of the articular lesions in gout seems often to be determined by the particular occupation of the subject.

In the higher walks of life, too, it is notorious that fibrositis usually picks out any joint that may have been overworked, or at some period, often remote, the site of injury.

Thus golfers, for example, are apt to suffer in their shoulder, tennis-players in the elbow, and anglers likewise after fly fishing.

It is, however, only in these *monarticular* types of so-called "periarticular fibrositis" that we can discern the influence of over-exercise or strain; for when we come to deal with the more severe varieties of *oligo-* or *poly-articular* distribution, there is little or no evidence of the intrusion of this factor.

Occasionally, as in the *specific* types of arthritis, notably gonococcal and pneumococcal, there may be a tendency for the primary manifestations to occur in a joint the site of an old injury or strain.

But in the majority of instances of *undifferentiated* infective arthritis or chronic rheumatism, as in the specific arthritides, the influence of such agencies can be excluded.

As to the *modus operandi* of these mechanical factors, when present, one can only suggest that they produce a *locus minoris resistantiæ* which favours local infection. In *localized* types, presumably, the implicated germs are of low virulence, whose lodgment is favoured by these factors, whereas in more severe arthritis of *generalized* distribution no such contributory aid is required to establish the disorder.

Muscular Types.—The constant repetition of a certain set of muscular movements, as well as the prolonged maintenance of strained postures, do apparently in some obscure way help to decide the actual site of the morbid process.

While this statement is doubtless true of all varieties of muscular fibrositis, such influences are chiefly to be discerned in regard of *lumbago*, which we shall accordingly take as our type.

Thus, for instance, many of our examples were engaged as miners, gardeners, or labourers, and, even excluding cases of definitely traumatic origin, it seems probable that the constant stooping to lift and carry heavy weights, with its associated strain on the lumbar muscles, exerted a localizing effect.

Again, the disorder occurs with notable frequency in those who habitually maintain a somewhat forced attitude—for instance, coachmen, who have to sit bolt upright on a box-seat; or, on the other hand, cobblers, carpenters, and the like, who sit or stand for prolonged periods with their trunks flexed acutely forwards.

These factors are even more provocative of attacks if combined with exposure to extremes of temperature. Hence its frequency in bakers, stokers, and those of the peasant class who work for long periods with bent backs under a broiling sun.

No consideration of the localizing influences of occupation in lumbago would be complete if it did not take cognizance of that vexed question—the relationship of *trauma* to this affection.

For some authorities, more particularly German physicians, would have us believe that almost all instances of the disorder are of traumatic origin. Accordingly they much deprecate the fallacy, as they consider it, of attributing most cases to the " rheumatic " category. In their opinion this is the outcome of superficial observation on our part, claiming on their side that all our so-called " rheumatic " types in reality arise from injury, not of extrinsic origin, but the consequence of some *intrinsic* movement, with strain of the lumbar muscles.

In opposition to this, it may be asserted that a patient is but too apt to assume that any sudden movement or change of posture followed by excruciating pain must of necessity be violent in nature; whereas this is certainly not so, and our opinion is that the particular movement impeached is not the *causa causans* of the disease so much as the occasion of its appearance.

Albeit it is undeniable that, given a " rheumatic " state, the slightest and most banal circumstance, a trivial muscular effort, the temporary assumption of some strained attitude, may evoke phenomena whose intensity is quite disproportionate to the assumed cause.

Such sensitiveness on the part of the fibro-muscular structures certainly seems to indicate that they are in an abnormally unstable condition, the outcome of an ill-understood pathological state.

We have an analogy in the shape of gout, for we all know how readily a trivial injury may precipitate an arthritic outbreak, and it seems quite reasonable to suppose that the *muscles* in these often gouty subjects may react in much the same manner.

Personally, we are inclined to believe that in all cases of muscular fibrositis of abrupt onset the suddenness is *apparent rather than real.* In other words, we think it probable that a condition of fibrositis, attended by more or less infiltration, has been developing after an insidious or subterranean fashion, and as such may have lain dormant without giving rise to symptoms for an indefinite period.

That the morbid process may remain latent seems indicated by the fact that in the *intervals* of recurring attacks of lumbago *infiltrations or nodules* can almost invariably be detected in the affected muscles or aponeuroses, although their presence meanwhile gives rise to no subjective symptoms.

The fact that nodules may be present without causing symptoms seems to suggest that their initial formation may take place equally silently, and that a sudden movement, far from being the true cause, simply lights up or aggravates the low-grade inflammatory process, and thus determines the outbreak.

To our mind, therefore, the action of trauma, in the vast majority of cases, not only in lumbago, but in other muscular types of fibrositis, is an *indirect* one. In other words, this factor cannot be regarded as an original, but only as an *exciting* or *determining*, cause of the disorder.

In asserting this we do not for one moment deny the existence of traumatic types of lumbago and other forms of fibrositis, but we would only admit to such a category those examples in which there is a *definite history of injury*, and to their consideration we have devoted a succeeding section.

Neuralgic Types.—In regard of these, also, the localizing effect of occupation is worthy of brief allusion. Thus sciatica is obtrusively common among those who continuously and forcibly bend the body at the hip—viz., miners, stokers, and labourers, who sink down with one knee bent in order to raise heavy loads of coal, soil, and so forth, in their shovels.

On the other hand, those engaged in sedentary callings, if they sit awkwardly or upon unsuitable stools or chairs, sometimes develop the same affection, and in both instances presumably as the result of undue compression of, or undue traction upon, the sciatic nerve trunk.

That type known as *peroneal* sciatica, too, occurs with suspicious frequency in those who follow their occupation in a kneeling position, such as potato-pickers, carpet-layers, etc., and it is in all probability due to compression of the peroneal branch as it passes between the two heads of the biceps.

In this connection we have to recognize also that mechanical causes, such as pressure by new growths, can initiate actual changes in the fibrous sheaths of the nerve trunks, as, for instance, in the so-called *pressure sciaticas and brachialgias.*

In conclusion it may be remarked that many analogies suggest the potency of *mechanical* factors in *localizing* the site of fibrositis in particular instances.

In the *arthritic* sphere we find the localizing effects of occupation very clearly shown in gout, and to a lesser degree in other forms of arthritis.

Again, in regard to *muscles*, we may point out that in lead palsy it is precisely those which are engaged in the movements of painting that are picked out—viz., the extensors—while those little concerned—supinator longus and extensor longus pollicis—pass unscathed.

Reasoning by analogy, is it not possible that the same controlling action is exerted by the subject's occupation in fibrositis ?

Also, in *neuralgic* types of fibrositis, is it not significant that sciatica and brachialgia are in the vast majority of instances *unilateral*, not bilateral, as in polyneuritis ?

Now, in the latter its symmetrical distribution indicates clearly that local agencies exert little or no influence, the situation being dominated, as it were, by the underlying faulty blood-state.

On the other hand, the *unilateral* distribution, typical, for example, of sciatica, plainly demonstrates the predominating sway exercised by *local* agencies, and this even in the case of undoubtedly infective types.

Other Determining Causes of Relapses or Exacerbations.

Among the most prominent and frequent causes of recurrences are, of course, *gastro-intestinal derangements* and attacks of *pharyngitis or tonsillitis.* How important a part alimentary disturbances play is shown by the swift sureness with which an outbreak follows the consumption of heavy wines, malt liquors, or unsuitable foodstuffs.

Presumably, in the majority of instances the functional or catarrhal states of the alimentary tract thus produced favour the migration, and entry therefrom into the tissues, of micro-organisms, and this at any point along its whole length.

Again, *sore throats* are a common cause of relapses, and presumably the development or recrudescence of pain under such circumstances is to be referred to fresh infection taking place at the inflamed site.

In *recurring* attacks the site of suffering is often predetermined by the location of any existing *nodules or indurations*, whether these be situated in the investments of a joint, the sheath or substance of a muscle, or the fibrous covering of the nerve.

Summary of Determining or Exciting Causes.

As regards atmospheric and climatic conditions, we noted that a *low temperature and atmospheric humidity*, with or without *northerly* or *easterly winds*, are the most productive of attacks.

Also that *soil dampness* and *general sanitary defects*, more than geological features, were conducive to the development of fibrositis.

Moreover, taking as our criterion the effects of hypothermia on animals, we suggest that the foregoing factors, either through the medium of " chill " or depression of physiological resistance, favour the occurrence of subinfection.

In regard of *excessive muscular exercise* we saw how—using the word in its strict sense—a state of autotoxæmia was produced through over-accumulation of the waste products of muscle katabolism, an effect accentuated if the muscular toil were pursued in a low temperature. The increased toxicity of the blood-plasma thus produced doubtless exerts an untoward influence on the *vis resistantiœ.*

But, apart from this, it is probable that in muscles disabled by previous attacks local irritation by retained " fatigue-stuffs " is not without its effect, while coincident minute strains or tears in the muscle capillaries permit the more ready egress of germs from the blood-stream.

Also we pointed out how *deficient muscular exercise*, particularly if combined with excessive food intake, leads to retention of waste or toxic products, and, as such cases are often attended by functional derangements in the alimentary canal, the occurrence of subinfection is again here only too likely.

We would, indeed, emphasize the important part played by these *anomalies of muscle metabolism* in favouring the development of fibrositis, and this not only in the *muscular* structures, but also in the *joints* and *nerve sheaths.*

The influence of *occupation* and the relationship of *strain* and *mechanical factors* in localizing the site of the morbid process have been considered, and also the special liability of certain callings.

In conclusion, throughout this section on general etiology our aim and endeavour has been to deal with the original and determining factors germane or common to *all* varieties of fibrositis, and so to obviate needless repetition when considering seriatim its various clinical syndromes.

For the mode of production of each, if not of all the types of fibrositis, presents certain peculiarities which are worthy of attention, and to that end we have, when necessary, prefaced our clinical description of the separate varieties with an account of their special etiology.

CHAPTER IV

FIBROSITIS, OR CHRONIC RHEUMATISM: MORBID ANATOMY

In his immortal work, "De Sedibus et Causis Morborum," Morgagni remarks that the more frequent a disease, the more essential is it that its phenomena should be carefully investigated, and, if possible, linked up with some structural change in the bodily textures.

It may be truly said that this dictum of Morgagni crystallizes, as it were, the code of pathology professed by the modern or eclectic school—viz., that the alterations in the tissues and organs are of vital importance to the true comprehension of the phenomena of any disease.

Only, indeed, when this principle was laboriously applied to the study of chronic rheumatism did our knowledge of this disorder attain to any measure of exactitude.

In regard of the articular types, how slowly their anatomical differentiation from other varieties of arthritis has been effected a glance at our previous historical retrospect but too plainly shows, and to recapitulate its various stages would be redundant. Albeit, when dealing with the morbid anatomy of muscular rheumatism, we shall permit ourselves more licence in this respect, as in the light of recent revelations the studies of earlier investigations regarding the anatomical substratum of this variety are of extreme interest.

Articular Fibrositis.

The differentiation of joint diseases, as we know, varies according to the structures primarily or predominantly involved.

As regards chronic articular rheumatism, numerous observations have shown that the *periarticular*, *subsynovial*, and *ligamentous* tissues are more often and more deeply affected by the morbid process than the synovial or bony elements.

Still, so intimately interwoven are the integral parts of any joint that no form of arthritic disease remains long confined to one tissue, so that, when the pathological process is of some duration, it will generally be found to involve every element of the articulation.

With this reservation as to the impossibility of sharply defining the exact limits of the anatomical change in any given case, we shall now proceed to indicate the essential character of the structural alterations in so-called "chronic articular rheumatism."

By way of prelude, one point must be emphasized—viz., that, although clinically we recognize various forms differentiated broadly by the severity and extent of the articular lesions, still, anatomically speaking, no sharp discrimination can be effected between these varieties, any pathological difference between them being merely *quantitative*, and not qualitative.

Any distinction that can be drawn between the milder forms of periarticular fibrositis and that malign type, *le rhumatisme chronique fibreux*, is purely arbitrary, inasmuch as the anatomical changes produced are identical in site and nature, differing only in degree.

In all varieties of the disorder the brunt of the morbid process falls upon the periarticular and capsular structures, more particularly their fibrous-tissue elements.

In the milder and more transient types no appreciable change is detectable, but should the infective or toxic action be more persistent, a serous exudation into the fibrous laminæ round the joint ensues, with leucocytic infiltration of these textures. Even at this stage in the more favourable instances complete resolution and absorption may ensue.

Not infrequently, however, this spontaneous *restitutio ad integrum* is but imperfectly attained, the incomplete dissipation of the newly-formed products favouring a recrudescence of the pathological process on the slightest pretext. In unfavourable cases a more active proliferation of the connective tissue occurs, and the inflammatory overgrowth may be of high grade.

Such, in brief, are the anatomical changes that ensue in mild types, usually monarticular, of *periarticular fibrositis*, and they differ in degree only from those characteristic of that large group, the *undifferentiated infective arthritides*, which constitute the bulk of the content of chronic articular rheumatism.

In this type, often termed "infective," "septic," or "toxic" arthritis, endless grades of severity in the anatomical changes may be observed, according to the nature of the responsible organism or its toxins.

It may take the form of a transient effusion involving two, three, or more articulations. In the more severe instances, however, this is rapidly masked by the swift extension of the inflammatory process to the periarticular, subsynovial, and ligamentous tissues.

The small-celled infiltration of these structures swiftly becomes organized, with resultant thickening, more or less diffuse, of capsule, ligament, and synovial membrane.

The morbid process frequently involves the tendon sheaths, which, at first distended by serous effusion, later become thickened and partly filled by fibrous material.

Similar changes occasionally take place in the related *bursæ* and the *periosteum* of the adjacent bone, with in some instances the formation of small irregular osteophytes.

The pathological change, in short, amounts to a more or less diffuse *sclerosis* of the joint structures, and to this may be referred the painful stiffness and loss of pliability which are such characteristic features of these so-called " rheumatic " affections.

Apart from the intrasynovial adhesions, the wasting and contracture of the muscles often lead to limitation of movement and malposition. While the atrophy is due partly to disuse and partly to reflex neural influences, another factor may also contribute; for not only the tendons, but the interstitial tissues of the muscle substance, may be invaded by the inflammatory change, and the resulting nodular or diffuse infiltration may cause secondary wasting through pressure on the neighbouring muscular fasciculi.

Fortunately, in the majority of instances, the disease, if appropriately treated, does not proceed to its fell end, nor does it commonly tend to implicate many articulations.

Rhumatisme Chronique Fibreux.

This malign type of chronic fibrous rheumatism is now well recognized, as since Jaccoud's classical instance numerous examples have been cited by Tedeschini, Charcot, Menjaud, as well as numerous English observers.

The joint lesions in this variety are *generalized*, and the morbid process attacks all the joints, large and small, including the spine; but its effects are more obvious and more severe in those of the feet and hands.

Anatomically speaking, the condition is one of an inveterate and aggravated form of fibrositis, involving not only the periarticular tissues, but also the related tendinous sheaths and aponeurotic expansions.

The changes in the fibro-cellular textures in advanced stages present the appearance of an atrophic sclerosis, the retraction of the cicatricial tissues thus formed leading to bony malposition and a spurious ankylosis.

As a result of this shrinkage, the articular extremities are delineated more clearly, and their greater prominence gives them an appearance of being really enlarged.

The peripheral muscular atrophy commonly associated with the joint lesions also contributes to exaggerate this false impression of increased size.

But, as Jaccoud first pointed out, no hypertrophy of the articular ends occurs, and no *osteophytic outgrowths* make their appearance.

In this observer's classical instance, however, no autopsy was obtainable, and it was reserved for Brigidi and Banti to supply the necessary confirmation of Jaccoud's clinical deductions.

The subject of their anatomical examination was a middle-aged woman, in whom the condition had developed insidiously, involving progressively not only the small joints of the hands and feet, but also the larger articulations.

The changes found in this case constitute the basis upon which our knowledge of the morbid anatomy of the condition has been founded.

Articular Lesions.—The salient alterations take place in the periarticular and capsular structures, which, as a result of inflammatory fibrous hyperplasia, become greatly thickened and matted together.

Through the subsequent condensation and retraction of the dense fibrous overgrowth, the articular ends are held in an exorable grasp, which distorts and grievously hampers the efficiency of the joint.

The related tendinous sheaths, also the palmar and plantar aponeuroses, are similarly implicated, and their subsequent retraction is largely responsible for the articular deviations, luxations, and subluxations, which form so striking a feature of the condition.

In the hands the most complex distortions may develop, but flexion of the phalanges on the metacarpals, with deflection to the ulnar side, constitutes the chief deformity.

The malpositions produced resemble closely those of rheumatoid arthritis, with which, prior to Jaccoud's observation, the affection had been confused.

On opening the joint cavities, the cartilaginous surfaces are seen to be of normal aspect, showing neither cartilaginous nor bony outgrowths.

Changes in the Muscles.—Apart from atrophy of their substance, the interstitial tissues of the muscles are sometimes invaded by the morbid process, with the result that *nodules and thickenings* develop in them as well as in their sheaths.

In addition, the inflammatory change may extend to the periosteum of the adjacent bones, and also to the subcutaneous cellular tissues.

Visceral Changes.—Those that take place in the cardiac and vascular system alone call for special mention, and especially those which develop in the absence of any history of acute articular rheumatism.

Lesions of the aortic valves, the outcome of a slow sclerotic change, are noticeably frequent, and French authors—notably Guéneau de Mussy—believe that a special form of *endarteritis* is associated with the condition.

As we know, arterial capillary changes have been noted in the synovial membrane, both in osteo-arthritis and chronic villous arthritis, and we would suggest that more careful examination of the nutrient arteries of the affected joints in this disorder might throw some light on the etiology.

From the side of comparative pathology, Chalmers Watson states that in animals, the subjects of *chronic articular rheumatism*, he has frequently observed alterations in the *marrow of the long bones.*

This tissue presents alterations in colour and appearance, varying degrees of redness and gelatinous degeneration, also abnormal consistence due to sclerosis and calcareous changes.*

Conclusions.—In reviewing the anatomical changes, one salient fact emerges—viz., that a relative increase in the white fibrous connective tissues, not only in the periarticular structures, but also elsewhere, constitutes the pathological basis of so-called "chronic articular rheumatism."

In the absence of any knowledge as to the intimate pathogeny of the disease, we have to assume that this fibrous hyperplasia is the result of a chronic inflammatory process, of a reaction to persistent, though slight, irritation, either bacterial or toxic in nature.

Doubtless there is associated with it another factor, which we may describe as an idiosyncrasy, or a static susceptibility to increased proliferation on the part of the connective tissues in certain individuals.

We see also that, in common with all similar states of interstitial fibroses, the morbid process displays a marked tendency to assume a progressive and vicious character, to extend even after the original cause ceases to be in evidence. For, apart from the mere formation in excess of connective tissue, we have to reckon with the untoward consequences that follow its inherent tendency to undergo progressive condensation and retraction.

---

* As before remarked, the previous history and clinical course of Jaccoud's type suggest its microbial origin—in other words, that it belongs to the group of the undifferentiated infective arthritides. In view of Chalmers Watson's findings, it is interesting to note that some observers hold that the salient pathological feature of this group is a proliferative inflammatory process in the marrow of the articular ends or in the synovia, or both, and that some unknown peculiarity in these tissues determines their suitability as a nidus for infection from some remote local focus.

The *causa causans* of the malady being presumably due to a *series of infections or subinfections*, it is not surprising that this marked proclivity to fibrositis should spread beyond the locomotory apparatus.

We ourselves have been struck with the frequency with which *arteriosclerosis* figures in these subjects, while the same tendency to hyperplasia of the fibrous elements in the subcutaneous and muscular tissues also indicates clearly the widespread nature of the affection.

As our previous study of the etiology disclosed, the causal factors are of diverse nature, and it follows, therefore, that we are no longer justified in regarding the anatomical changes met with in so-called " chronic articular rheumatism " as being in any way of a specific kind.

Accordingly, we must assume a more catholic attitude towards the affection, one more in accord with the findings of modern research.

These plainly indicate that we must enlarge our conceptions of its etiology, not regarding it in any way as affiliated to any one cause, but rather as a morbid anatomical change, which may own a variety of origins.

Muscular Fibrositis.

In our introduction to this chapter we remarked that an historical review of the growth of our knowledge regarding the morbid anatomy of muscular rheumatism would, we thought, be advantageous, and to this end we shall essay a brief résumé.

Morgagni, as was noted, held very rational views on the importance of correlating disease with structural alteration in tissues, and it is gratifying to find that it is to this great man we are indebted for the first account of the anatomical changes produced by " rheumatism " in muscles.

The subject of his anatomical researches was a young goldsmith, who had suffered from chronic lumbago of a supposed " rheumatic " nature. At the autopsy, Morgagni noted that the lumbar muscles were changed in colour and consistence, and that throughout the whole of this discoloured mass the muscles were very loose and soft, separated in many places by effused products.

To come to more modern times, during the early part of the nineteenth century the more acute types of muscular rheumatism became the object of special study by French physicians, notably Touret and Couturier.

The former, in a "Dissertation sur le Rhumatisme Musculaire Aigu," records the interesting observation: "Tantôt on rencontre des concretions ovoide plus ou moins volumineuse dans les muscles"; while the latter, in a study of the same condition, remarks that "Le rhumatisme se termine souvent aussi par une exsudation gélatineuse, qui se pose à la surface des muscles affectés ou dans leurs gaines tendineuses."

It may be noted that this observation as to the presence of a gelatinous exudation on the surface of the muscles was also independently noted by Abernethy and Macleod.

A few years later Carmichael Smyth, though anticipated by Lobstein, affirmed that the phenomena of "rheumatism" were referable to an *inflammatory condition of the muscles.* Craigie, however, dismissed this view as being at best an ingenious assumption, maintaining that the morbid change was located, not in the muscular substance proper, but in the enveloping fibrous sheaths; in which contention he was supported by Scudamore, both claiming that the muscles were only implicated secondarily.

The foregoing brief historical retrospect shows that exact knowledge regarding the morbid anatomy of muscular rheumatism was only very slowly acquired.

Virchow's View.—Indeed, it was not until 1847, when the renowned German pathologist published the results of his histological researches upon rheumatic inflammation of the muscular tissues, that any sure and certain light was shed upon this vexed question.

His studies showed that the change in the muscles was primarily *an inflammation of the interstitial tissues,* the muscular fibres being only secondarily implicated—a view the substantial truth of which most succeeding observers have subscribed to.

Some years later, however, Oppolzer combated Virchow's view that the changes in the muscles were of inflammatory nature, alleging this as the outcome of his examination of an excised indurated portion of the soleus muscle. He proffered no other explanation of its origin, merely remarking that such localized thickenings were very generally to be found in muscular rheumatism.

Following Oppolzer's lead, several German investigators subjected to examination excised nodules of muscles, and among whom may be mentioned Gies, Krukenberg, Lindner, Hackenbruch, and Janicke, to whose researches we now advert.

Pathological Changes in Excised Nodules.

Macroscopic Appearance.—The diseased portions of muscles betrayed grave alterations in consistence and colour, the indurated tissue creaking under the knife, and those areas in which the morbid process was of greatest intensity presented an almost white lardaceous appearance.

In other regions less advanced the remains of the muscular tissue in the form of reddish-yellow foci were to be seen scattered here and there in the white ground substance.

In some instances the deeper-lying portions of muscles were the more severely affected, the superficial fibres showing but trivial change.

Microscopic Appearance.—In the more slightly affected areas widening of the interstitial spaces was observed, contrasting sharply with the density of contiguous parts more profoundly diseased.

These were composed of a connective tissue rich in nuclei, traversed by numerous vessels, and in which the atrophied muscular bundles lie embedded.

Of the muscular fasciculi some had undergone simple atrophy, and others degeneration, while their transverse striæ having almost completely disappeared, their longitudinal striation by contrast stood out in bold relief.

Here and there the muscular fibres had wholly vanished, the void in the tissue being completely filled up.

In the sarcolemma proliferation of nuclei was noted, while in the neighbourhood of the vessels small cell infiltration was present.

With the exception of Janicke's example, all the cases examined by the foregoing observers were of *long standing*, and, as it is most desirable that the *early* pathological changes should be elicited, a brief digression is allowable.

In this instance the patient, a man aged thirty, presented in his left sterno-mastoid a recent palpable infiltration, at first circumscribed, and which later became more diffused.

The swelling was exquisitely sensitive, and similar nodules were developed a few days afterwards, in the latissimus dorsi, trapezius, and biceps muscles.

Microscopic Appearances.—Briefly described, these consisted of a distinct widening of the muscular interstices, with atrophy, swelling, homogeneity, and in some areas complete destruction of the primitive muscular fibrils.

Although examined at such an early stage, a state of connective-tissue hypertrophy had declared itself, as evidenced by a large spindle-cell tissue rich in nuclei, some of which were undergoing a process of division. It is noteworthy that no small-cell infiltrations were found in the vicinity of the bloodvessels.

Bertelsmann, too, has recorded a similar example occurring in a young man, eighteen years old, the subject of "rheumatism," who developed successive crops of nodules affecting the calf muscles and those of the forearm.

One of these, situated in the belly of the left extensor carpi radialis, was excised.

Microscopic Appearance.—Histologically, it showed swelling of the primitive muscular fibrils, with destruction of the transverse striation, while marked cellular infiltration was noted, with copious fibrinous exudation into the interstices of the muscular fibres.

Another worker, Strauss, has recorded a series of cases of chronic rheumatism in which similar nodules, giving rise to rheumatic or sciatic pains, were detected.

In each of his cited instances he carefully excluded *trauma, syphilis*, and other conditions likely to vitiate his diagnosis of chronic rheumatism, all his patients attributing their trouble to catching cold.

In one of his cases an *intramuscular nodule* was excised for the relief of pain.

The subject, a man aged twenty-five, had suffered for some five or six years with severe rheumatic pains, especially in the right leg.

Macroscopic Appearance.—Examination revealed the presence of an extremely hard nodule the size of a walnut, embedded in the muscular bundles of the rectus femoris near its insertion.

The swelling was movable, as shown by electrical stimulation of the related muscle, while pressure on it caused aggravation of the lancinating pains in the limb.

The diagnosis of fibrous induration of the muscle having been arrived at, the patient submitted to its excision at the hands of Professor Hildebrandt.

The excised nodule was seen to be of greyish-white colour, dense consistence, and sharply delimited from the contiguous tissues both by colour and substance.

Microscopic Appearance.—Hardened in formalin and stained with eosin hæmatoxylin, it was seen to be composed of wavy, scattered, or irregularly-arranged strands of connective tissue.

Here and there between the connective tissue bundles were scattered a few atrophied muscular fibres, as well as a little recent granulation tissue. At the margin of the nodule some muscular fibres were seen to pass over into indurated tissue in much the same way as characterizes transition of muscle into tendon.

The nodule was essentially a fibrous induration, in which no giant cells, caseating processes, or trichinosis, were to be detected.

It is interesting to record that subsequent to its excision the pain in the limb permanently disappeared.

Strauss, reviewing the pathological findings of other workers in the same line, differentiated the following classes:

1. Instances in which single or multiple circumscribed nodules are to be found in a single muscle, the neighbouring tissues being uninvolved, and to which category belong some of the cases narrated by Reibmayer, Nathvig, Kleen, Ewer, Berghmann, Froriep, Helleday, and others.
2. Those in which the greater part or the whole of one solitary muscle with its sheath has been implicated, as described by Scriba, Berghmann, and Helleday.
3. Examples of mixed nature, the anatomical substratum of which consisted of a connective-tissue proliferation, involving not only the muscles, but also the periosteal, subcutaneous, and cutaneous tissues.

Thorel (1901), in an interesting review of the published cases. observes that such indurations are more prone to affect the muscles of the lower extremities; but, according to Ewer, the cucullaris, supinator longus, and pronator teres, are more often affected.

After emphasizing the value of Janicke and Bertelsmann's cases as portraying the *early* stages of the pathological change, he proceeds to discuss the anatomical findings in cases of longer duration.

In such he states the muscle fibres in the indurated area disappear, while in their place is found a hard sclerotic tissue filled with fat, or it may be a wavy or reticulated tissue, the meshes of which are filled with fluid.

At their margins the indurations show a gradual transition into young granulation tissue, with here and there an attempt at regeneration of the muscular fibres. The bloodvessels in the diseased area show contracted lumina, due to round-cell infiltration and hypertrophy of the adventitia and intima.

As opposed to these positive findings, one may allude to a case reported by Laquer, who, on microscopic examination of an excised indurated portion of the biceps, was unable to find any pathological changes in the affected muscle.

Stockman and Renton's Researches.—The histological characteristics of *rheumatic callosities or indurations* have been

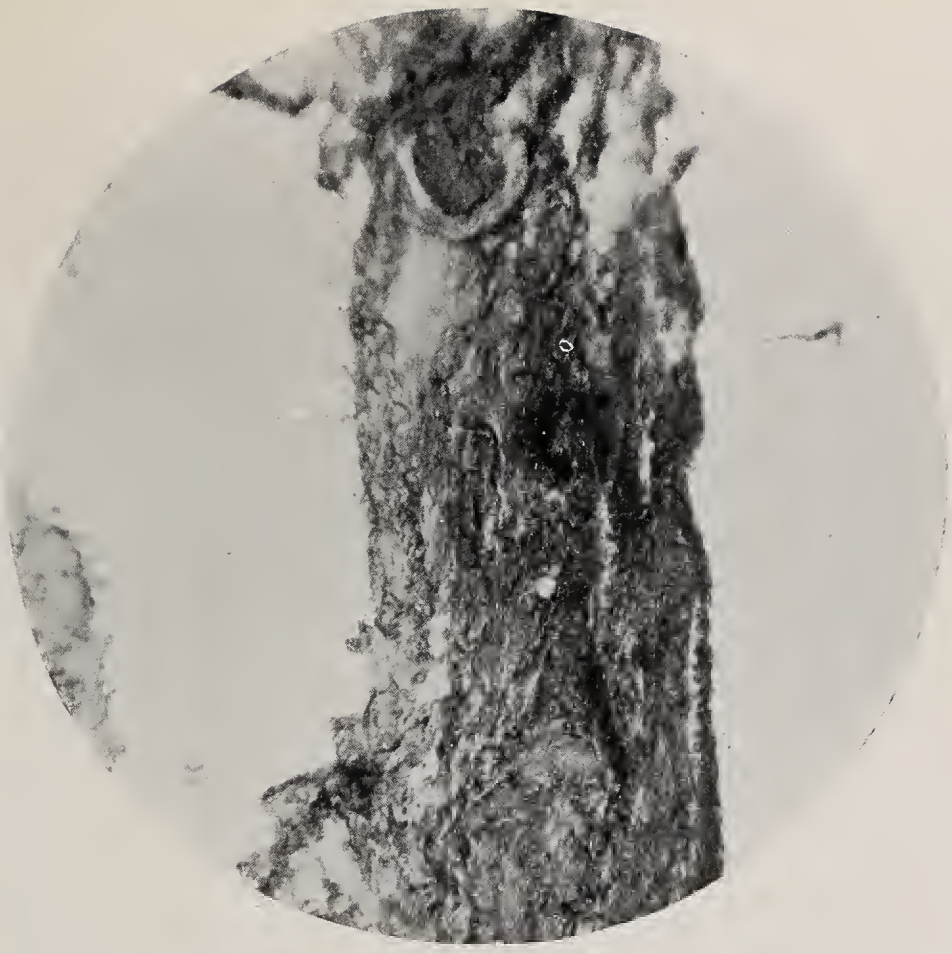


FIG. 6.—Section of inflamed perimysium, forming a painful swelling on the muscle. (× 140.) It consists of proliferated and œdematous fibrous tissue with an amorphous matrix, and at places this penetrated between the muscle fibres. In the section it is detached from the underlying muscle fibres.

(By kind permission of Professor Stockman of Glasgow.)

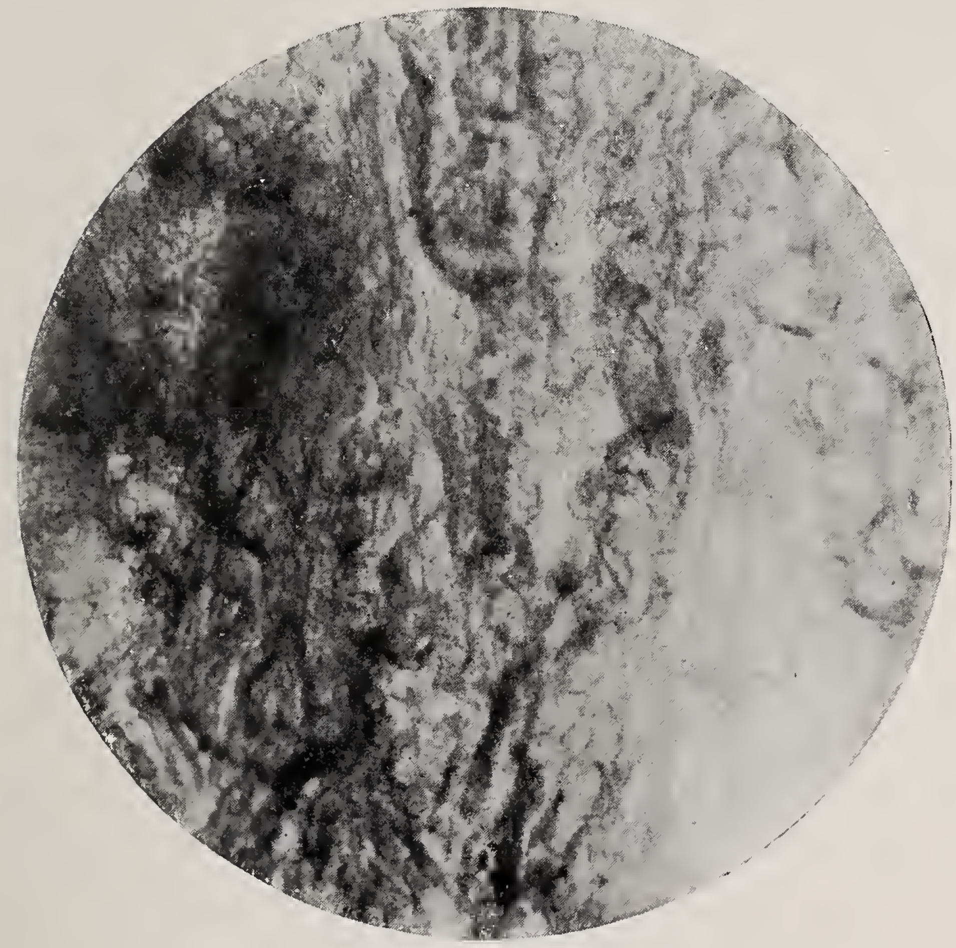


FIG. 7.—Portion of same. (× 550.)

(By kind permission of Professor Stockman of Glasgow.)

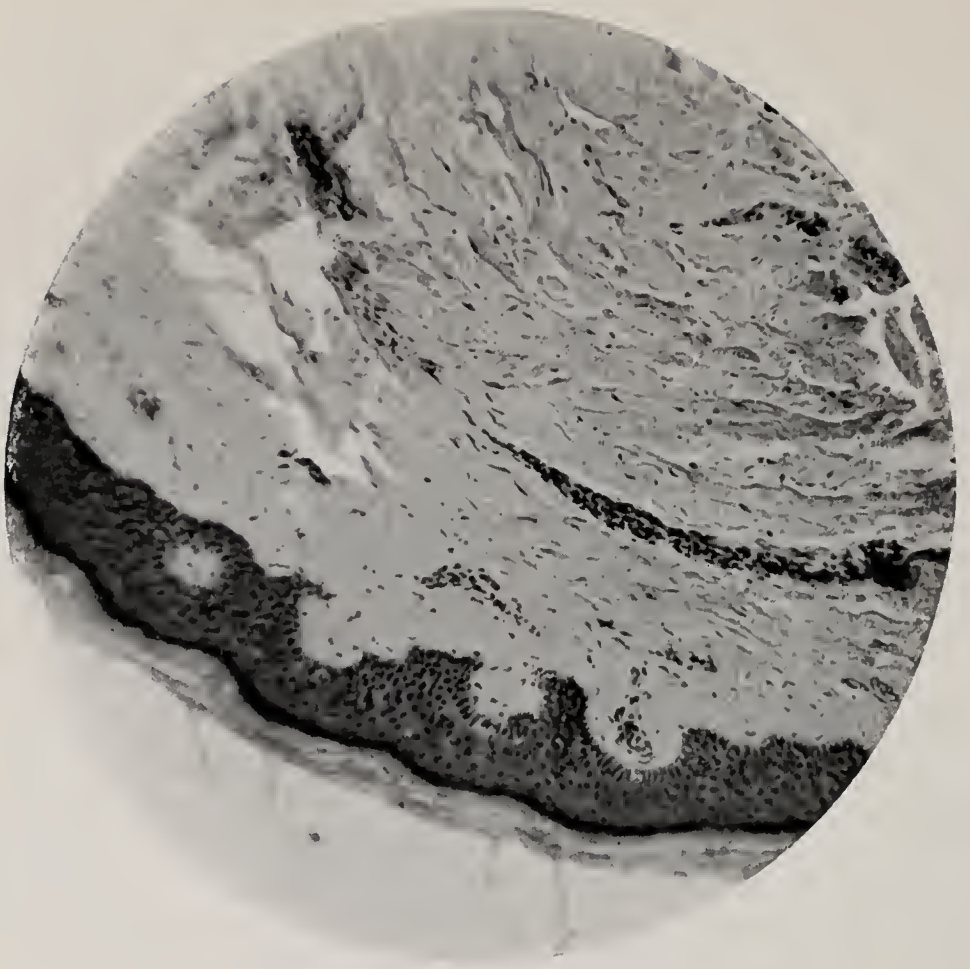


FIG. 8.—Section of fibrous nodule lying immediately under the skin and continuous with it. (× 75.) It had been massaged for some time.

(*By kind permission of Professor Stockman of Glasgow.*)

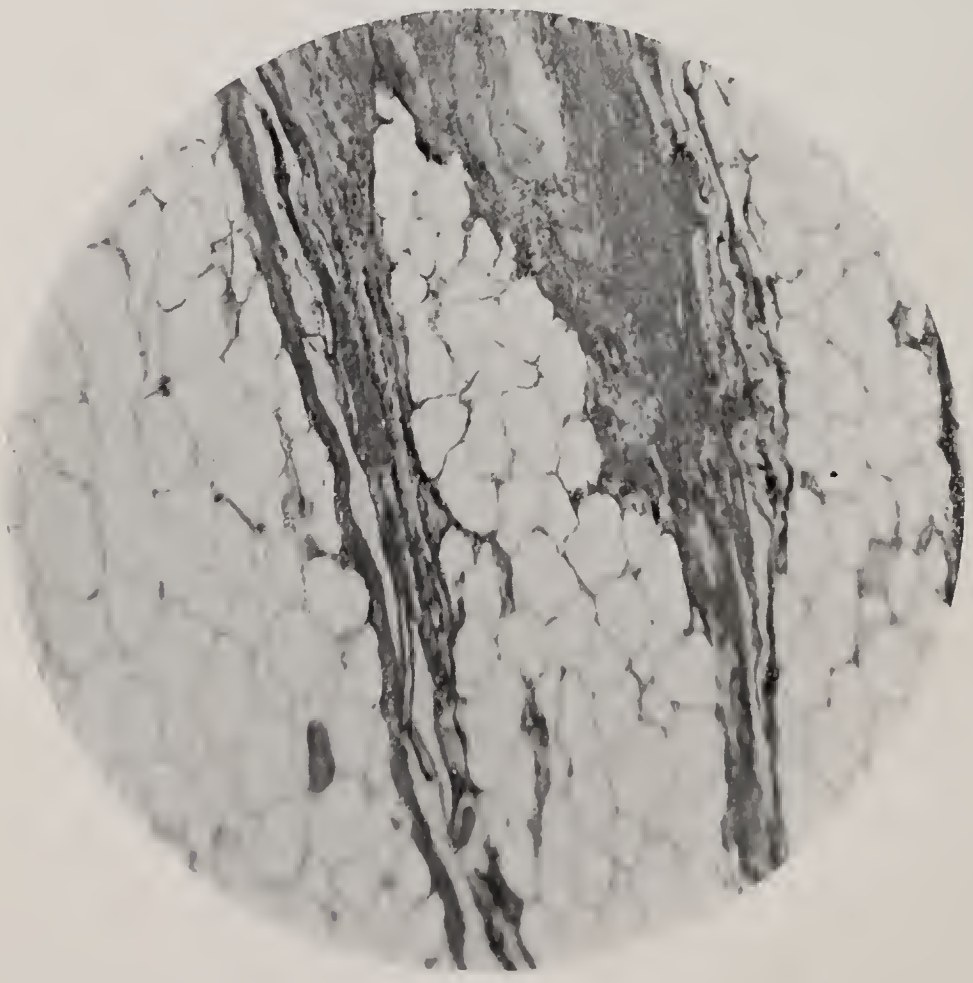


FIG. 9.—A strand of fibrous tissue lying in the subcutaneous fat, and spreading into it. (× 75.) This was painful on pressure.

(*By kind permission of Professor Stockman of Glasgow.*)

To face page 99.

recently studied by these observers, their study being conducted on nodules excised from muscles, subcutaneous tissues, and periosteum.

In one example a small nodule was excised from the buttock of a man, aged forty-five, who had suffered intermittently from muscular rheumatism, with occipital and sciatic neuralgia.

Palpation established the presence also of multiple nodules and fibrous thickenings in the neck and loin, which were very tender and sensitive to pressure.

The gluteal nodule was the size and shape of a small almond; it could be easily felt in the buttock, and appeared to be the site from which the sciatic pain radiated.

Macroscopic Appearance.—Its excision having been determined upon, it was found, when exposed, to consist of a swollen and slightly outstanding portion of the perimysium of the gluteus medius.

Microscopic Appearance.—After removal it was hardened in formalin, and vertical transverse sections showed that it consisted of a part of the fibrous-tissue sheath of the muscle, which was œdematous and had undergone considerable hypertrophy.

It was made up of white fibrous elements lying in an amorphous matrix, and in some places the fibrous tissue had insinuated itself between the muscular fibres, a few of these having partially degenerated—a result, the authors suggest, more probably due to the action of a toxin than to pressure.

A few fibroblasts were present, but no aggregation of leucocytes in the vicinity of the inflamed patch.

Very distinct *periarteritis and endarteritis*, with marked connective-tissue proliferation, was noted in the small bloodvessels.

The authors concluded, therefore, that the condition was due to a " chronic, but still comparatively recent, localized inflammation of the perimysium."

Subcutaneous Nodules.—Sections also were made of nodules attached to the skin, and of some localized in the subcutaneous tissues. In the former the true skin and dense fibrous tissues of the nodule were welded together. Those embedded in the subcutaneous tissue were composed of irregularly-shaped, often branching, masses of fibrous tissue, or thin strands, which increased in size through the fibroblasts extending along the connective tissue of the fat cells.

The same intense periarteritis and endarteritis, with numerous bloodvessels, were observed in the section of this nodule, the fibrous tissue of which was of very dense consistence.

Periosteal Nodules.—The same observers excised a small portion of a periosteal swelling on the sternum, of quite recent date, which they consider had all the characters of a rheumatic periostitis.

Microscopic Appearance.—The sections showed an œdematous and proliferating fibrous tissue, with a good many fibroblasts and many newly-formed or forming capillaries. Here and there the fibrous tissue was more dense, while the connective tissue in the vessel walls was greatly hypertrophied; but there was an entire lack of the local leucocytic reaction.

Stockman was unable to detect any organisms in the tissues, but suggests that the staining methods may not have been suitable.

He considers that the inflammatory overgrowth of the connective tissue is most probably to be ascribed to a *local invasion of microbes or to the action of toxins.*

Comparative Morbid Anatomy.

Muscular rheumatism is extremely common in horses, dogs, and cattle; and, according to Friedberger and Fröhner, it attacks not infrequently sheep and pigs.

According to these observers, in mild forms no recognizable pathological traces of the hyperæmia or slight inflammation remain after death.

But, on the other hand, when the attack is more severe and of longer duration, the existence of anatomical changes is very evident.

Well-marked signs of muscular inflammation are present, such as hyperæmia, hæmorrhage, serous exudation into the interstitial connective tissue (perimysium internum), softening, discoloration, and disintegration, of the muscular fibres.

Moreover, it is interesting to note that, in more advanced cases, not only marked atrophy of the affected muscles, but also inflammatory proliferation of their interstitial fibrous tissues, ensue, which culminates in the formation of so-called "rheumatic nodules."

Researches in Horses.—Zschokke, who conducted some experimental investigations on horses affected with muscular rheumatism, observed the following pathological changes:

Microscopic examination revealed the presence of cloudy swelling, fatty and hyaline degeneration of muscular fibres, hyperæmia, and moderate infiltration of the small connective-tissue cells, with a tendency to rapid regeneration of the atrophied muscles.

Researches in Dogs.—In dogs attacked by muscular rheuma-

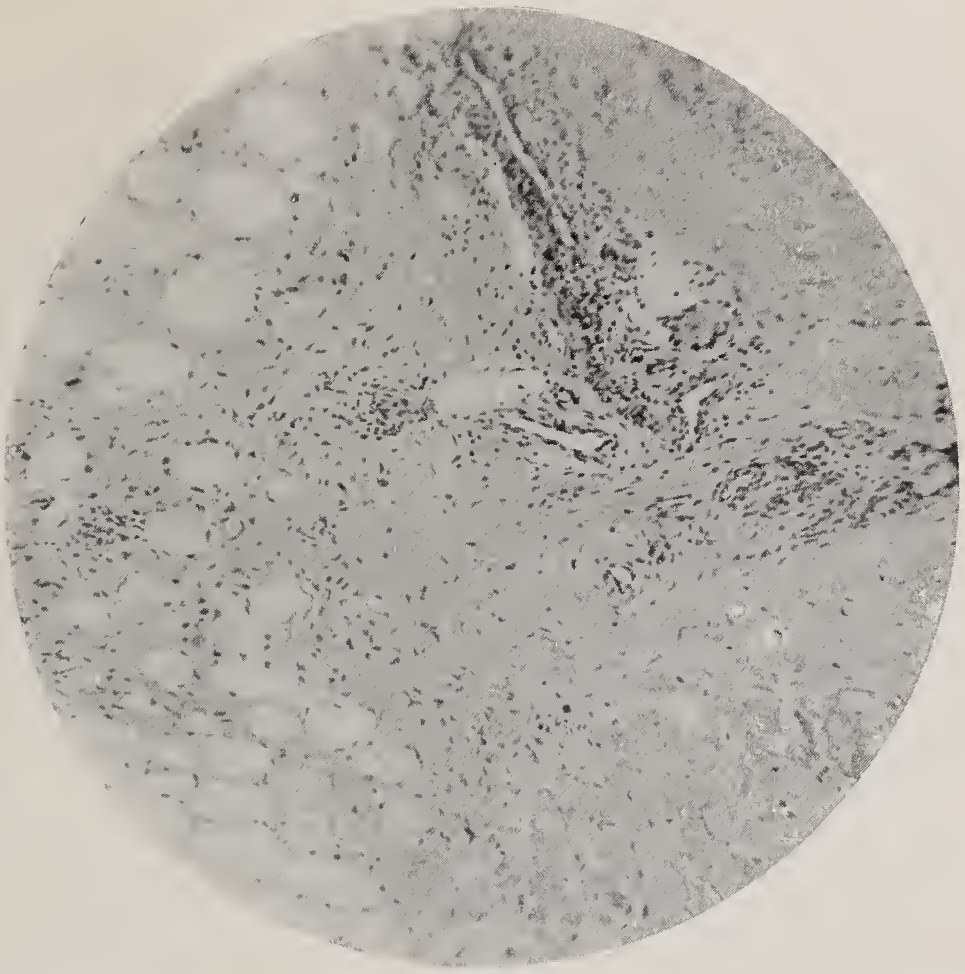


FIG. 10.—Section of dense subcutaneous nodule spreading into the fatty tissue. (× 75.)

(*By kind permission of Professor Stockman of Glasgow.*)

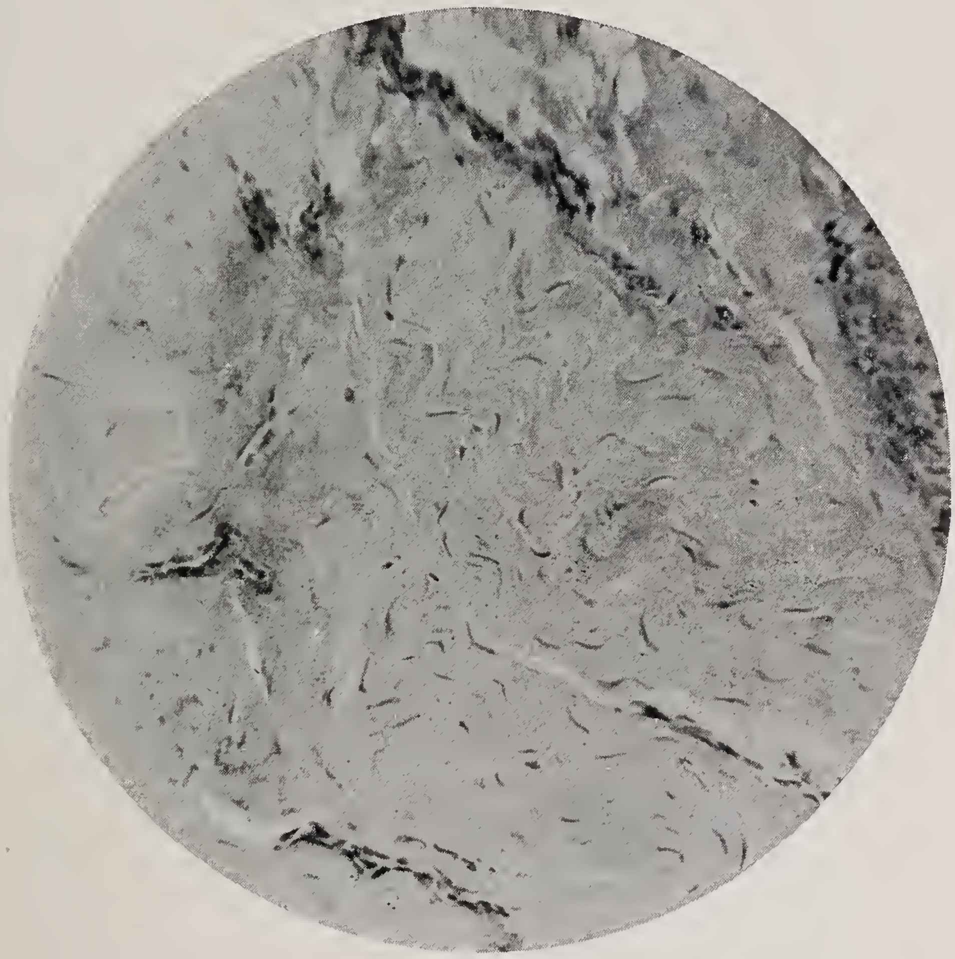


FIG. 11.—Section of a nodule which lay in the fascia. (× 140.) It had been massaged, but instead of dispersing became very hard and fibrous.

(*By kind permission of Professor Stockman of Glasgow.*)

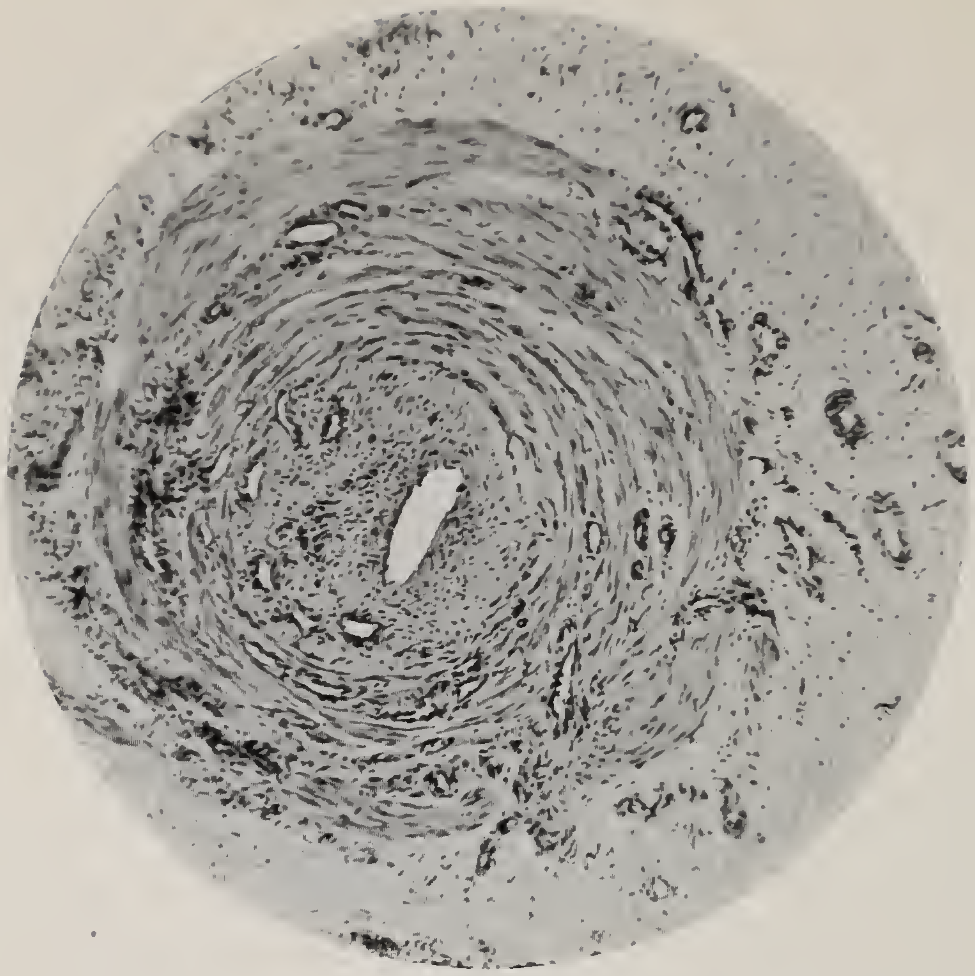


Fig. 12.—Section of portion of a nodule showing periarteritis and endarteritis and numerous bloodvessels. (× 75.) The nodule had been massaged for some time.

(By kind permission of Professor Stockman of Glasgow.)

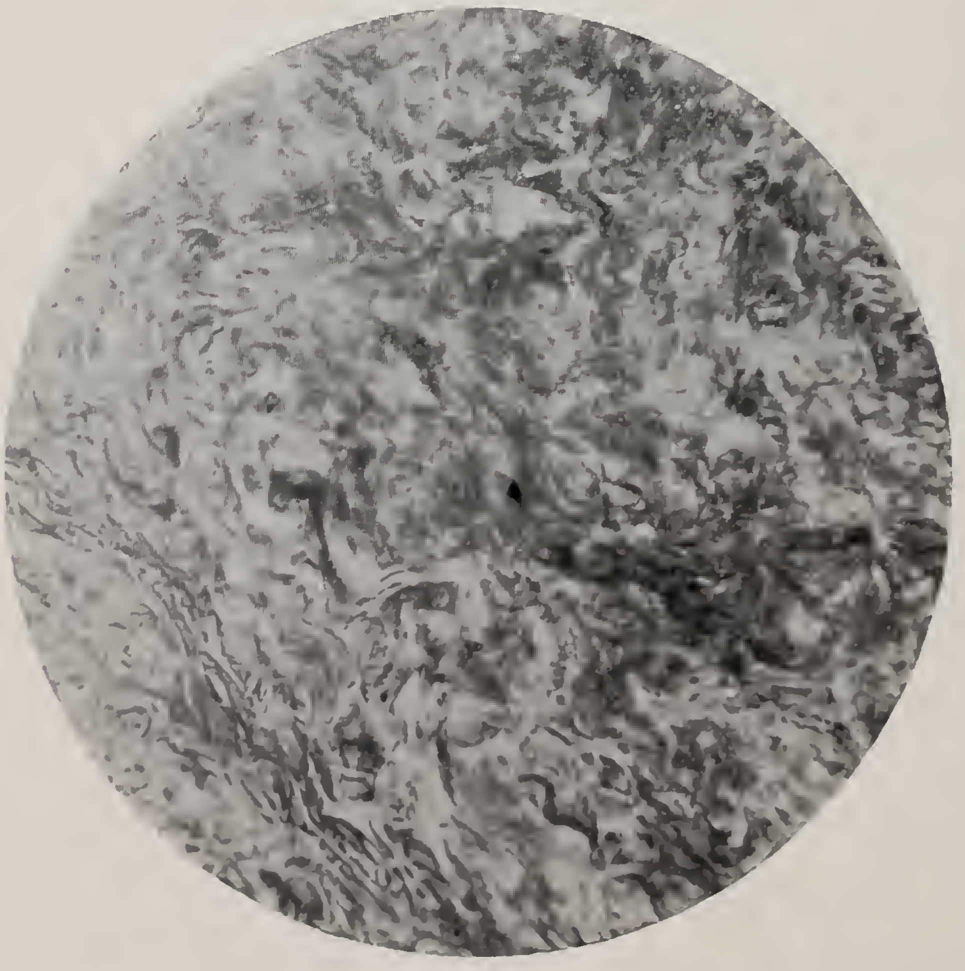


Fig. 13.—Section of recent periosteal nodule. (× 140.) It shows the increased and œdematous fibrous tissue.

(By kind permission of Professor Stockman of Glasgow.)

To face page 101.

tism, Siedamgrotzky found in all the aponeuroses diffused redness and serous infiltration, the muscles also being bright red.

In one animal, subject to chronic rheumatism in the masticatory muscles, he observed an intense chronic interstitial myositis in these structures.

In a similar case studied by Bruchmuller the intermuscular connective tissue was infiltrated with serum, and permeated with a reddish-yellow gelatinous fluid, while the muscular fibres, notably pale in colour, had lost their transverse striation and undergone fatty degeneration.

The foregoing observations on the morbid changes produced by muscular rheumatism in animals are most interesting and illuminating.

It will have been noted that the anatomical changes in the main are very similar to those observed in human subjects, and, having regard to the greater facility with which morbid material is obtainable for examination, we may reasonably anticipate that extended studies on the same line will do much to clarify our pathological conceptions of muscular rheumatism.

Summary.

In reviewing the foregoing pathological data as revealed by studies on men and animals, we are enabled to form a reasonable conception of the commencement and general trend of the morbid process in muscular rheumatism.

Without undue assumption, we may presume that in the initial stages, as a result probably of *subinfection*, there ensues a state of hyperæmia and dilatation of the small bloodvessels and capillaries in one or more areas of the muscular system, with possibly in some cases minute hæmorrhages.

Coincidently, a migration of cells into the interstitial tissues takes place, the leucocytes insinuating themselves between the muscular bundles and even the individual fibrils.

Swiftly a proliferation of the nuclei of the connective tissue begins, and gradually an infiltration of the muscles is brought about, this varying in degree and extent according to the intensity of the morbid process.

Such, in all probability, constitutes the extent of the pathological changes in mild or transient cases, and resolution and absorption being readily effected, the muscle is restored to normal.

If, however, the inflammatory stage be more intense or protracted, the nuclei of the connective-tissue fibres undergo gradual transformation. These eventually assume the character of wavy interlacing processes, more or less densely packed, and within the meshes of which may be discerned a few imprisoned nuclei.

According to the vigour with which the interstitial connective tissue proliferates, the muscular bundles and fibrils undergo a greater or less degree of separation and compression.

As a result of the pressure of the invading tissues, the muscular fibres begin to degenerate, and are either completely replaced or destroyed, or may be represented by a few small islets of solitary fibres embedded in the overgrowth of fibrous tissue, and in this way the *infiltrations and nodules*, so familiar to us clinically, develop in the substance of the muscles.

Obviously, once this stage of neoformation is reached, spontaneous restitution to normal is impossible, and the patch of fibrous induration remains fixed and immovable.

While it may after shrinkage cause no trouble, more commonly it gives rise to pain, compromises the functional efficiency of the implicated muscles to a greater or less degree, and by its presence favours the recurrence of acute attacks of the affection.

As we have before pointed out, the aponeurotic sheaths of the muscles are not spared, neither are the fasciæ nor the tendons.

Indeed, the process often begins in the fibrous investments of the muscles and their tendons. The subcutaneous, fatty, and cellular tissues, too, are not immune, or, for that matter, the nerve sheaths.

We see, therefore, how impartially the morbid process distributes itself over the fibrous tissues of the body fabric generally, and at the same time how, under this conception of the disease, its varied clinical forms fall into line as manifestations, merely topographically differentiated, of one and the same pathological change.

Neuro-Fibrositis, or Fibrositis of the Nerve Sheaths.

Under the vague if comprehensive term "neuralgic rheumatism," the older physicians grouped together all forms of neuralgia assumed by them to be of "rheumatic" origin.

But prior to the time of Craigie, whose pioneer work in this as in other spheres of chronic rheumatism has been largely overlooked, they had no clear conceptions regarding its pathology.

This old physician, however, pronounced it to be a complex process, affecting simultaneously the aponeurotic sheath and the neurilemma.

Thus, in regard to sciatica, he maintained that at its onset the *materies morbi* attacked chiefly the superficial and aponeurotic coverings of the glutei and tensor vaginæ femoris, and that only subsequently did it encroach upon the sheath of the sciatic trunk, giving rise to neuralgic, and in some cases paralytic, symptoms.

Scudamore, too, in his work remarks that the effects of "chronic rheumatism" were not exclusively confined to the muscular and arthritic structures, but that the nerves, either the sheaths that enclosed the filaments or the filaments themselves, were occasionally attacked, more particularly the sciatic trunk.

Fuller, also, notwithstanding his apparent lack of any pathological data, was convinced that not only thickening of the sheath, but that lesions of the nerve itself, might occur secondarily.

It will be seen from the foregoing brief historical résumé that our forebears, despite the lacunæ in their pathological knowledge, had evolved very shrewd, if unestablished, theories as to the manner in which the morbid process beset the nerve trunks.

The substantial truth of the speculation of the older physicians was shown in the first place, we believe, by Vogel, who in cut sections from rheumatic muscles observed a small-cell infiltration associated with thickening, not only of the sarcolemma, but also of the neurilemma of the contiguous nerve fibres.

The more important contributions to the pathological anatomy of this aspect of fibrositis have been derived from studies of *sciatica.* This disorder, however, of itself does not lead to death, and consequently, despite its extreme frequency, observations on the morbid changes are but meagre.

For the most part they have been gleaned partly from post-mortem examination, and partly from investigations made when the nerve itself has been exposed either for the purpose of stretching, or extirpating adhesions or nodules in the sheath or adjacent fasciæ.

As a rule in the acute stages the nerve trunk shows swelling, due either to œdema or sero-fibrinous exudation. Microscopically, the nerve sheath seems to be the seat of small-cell infiltration, the leucocytes also crowding together between it and the nerve trunk.

The nerve covering alone may be implicated, constituting what is known as a "*perineuritis,*" or, on the other hand, the inflammatory products may encroach on or intrude between the nerve fibres—*i.e., interstitial neuritis.* As in all other forms, the nerve fibres themselves show as a consequence a variable degree of change. When limited to the sheath, the induced effects in the nerve trunk will vary according to the degree of pressure imposed by the inflammatory products. Hence a greater intensity in the morbid process develops at spots where the nerve sheath is unable to expand, and the pressure is severe.

The effects of pressure are more readily seen where the nerve turns round the shaft of a bone, or at its site of emergence from bony channels or fascial coverings.

The risk of accompanying nerve changes is, of course, enhanced when the process invades the interstitial tissues.

Sir William Gowers states that, when limited to the *sheath*, the nerve fibres "usually present little change," if expansion be not interfered with, and that when the *interstitial* tissues are involved, although the fibres suffer more readily, yet such is not invariably the case.

The pathological process when protracted culminates in the formation of fibrous tissue, which may involve the sheath, the interstitial tissues, or both. Commonly it is the outcome of the direct extension of the morbid change from the superimposed or contiguous fibro-muscular or aponeurotic structures. Thus, for example, in sciatica the primary mischief is often located in the lumbo-sacral fibrous tissues, the prolongations of which extend to the sciatic notch in the neighbourhood of the nerve sheath. In the same way, in brachialgia the condition frequently begins as a diffuse fibrositis of the deltoid, which, spreading inwards, involves successively the subdeltoid bursa, capsule of the joint, and ultimately the nerve sheath.

In regard of investigations made during life, it must be admitted that the pathological findings have been notably inconstant. Even in cases sufficiently inveterate to justify surgical intervention, the microscopical changes noted in the nerve were in some few instances either negative or insignificant. At the most, swelling and sometimes thickening of the epineurium were observed, and in some even these macroscopical variations from normal were absent (Gubler-Robin, Leudet, Hunt).

On the other hand, it is worth recording that, of a series of 47 cases operated on by A. Pers, *fibrous bands* were in 30 instances found in the neighbourhood of the foramen. Of the remainder, adhesions were found in 13, not only in the sciatic notch, but in the thigh, and in 3 in the thigh only.

Also it may be added that in half the cases the nerve was reddened owing to the perineuritis that was present.

In 32 instances, whose symptoms were suggestive of *adhesions*, Crawford Renton exposed the nerve trunk with a view to their removal. It was remarkable that in all cases they were found to be present, and in some instances the fibrous bands were widespread, extending from the sciatic notch to the middle of the thigh. Lastly, in one instance, in addition to the severance of adhesions, a nodule was found and removed from the sheath of the contiguous gluteal muscle.

Such, in brief, constitute the chief data on which our knowledge of the morbid anatomy is based; but it will not have escaped notice that in some of these reported examples the pathological changes were of minimal character or entirely absent.

Oppenheim, discussing this inconstancy in the anatomical findings at operation, is inclined to refer the symptoms in sciatica and other types of neuralgia to "*fine disturbances of nutrition in the nerve*, in its sheaths, in the nervi nervorum, and that these under certain conditions develop into *neuritis and perineuritis*."

This hypothesis supplies us with a very reasonable interpretation of the transitional cases, which shade imperceptibly from a state of neuralgia to one of neuritis.

In conclusion it seems quite permissible to suggest that this, like other varieties of chronic rheumatism, is due to a process of *recurring infections or subinfection*, and that in the milder instances the nerve sheaths are subjected to fleeting irritation by organisms of attenuated virulence or their toxins.

INFECTIVE OR TOXIC FIBROSITIS

(A) ARTICULAR TYPE

CHAPTER V

(A) ARTICULAR FIBROSITIS, OR CHRONIC ARTICULAR RHEUMATISM

Synonym : Chronic rheumatic arthritis.

Classification.

BEFORE proceeding to delineate the clinical features of chronic articular rheumatism, it will, by way of prelude, be advisable to consider briefly whether any satisfactory classification of the various joint affections grouped under this designation can be achieved.

If by the term "classification" be understood the ideal one —an *etiological* differentiation—then it must at once be frankly conceded that such is at present quite beyond our power, and we must perforce fall back upon some less exacting criterion.

Now, approaching the question from its *anatomical* aspect, one salient feature emerges, common to all types of chronic articular rheumatism : viz., the predominance of the morbid process in the periarticular tissues as opposed to the joint structures proper—the cartilages and synovial membrane.

In other words, we are confronted in all instances with a *periarthritis* of most varied intensity, the objective evidences of which, on the one hand, may be so slight as to be clinically unrecognizable, or, on the other, so profound as to completely disorganize the joint capsule and its related structures.

In daily practice, therefore, if we take as our measure the *severity of the morbid process*, we find at the one extreme examples scarcely meriting anything more than the term *arthralgia*, and at the other those malign forms associated with the name of Jaccoud—*le rhumatisme chronique fibreux.*

Interposed and linking up, as it were, these two antitheses are those endless transitional forms generically classed as the *infective arthritides of undifferentiated type.* Now, as we have shown—in this country, at any rate—this latter group is still included under the term "chronic articular rheumatism," and, judged anatomically, there is no objection to their inclusion under this designation, for in these forms of arthritis, also, the morbid changes are confined to, or predominate in, the periarticular tissues.

To sum up, then, we can, clinically speaking, divide our cases of chronic articular rheumatism into three main groups:

(*a*) *Arthralgic types*, in which the old term "dolor articulorum" represents the extent and character of the affection, the joints being merely the seat of pain, apparently unaccompanied by any anatomical lesion.

(*b*) *Periarthritic types*, comprising the infective arthritides of undifferentiated origin, and marked anatomically by definite periarticular infiltration of varied degree and extent.

(*c*) *Chronic fibrous rheumatism*, a group only distinguishable from Class (*b*) by the inveteracy of the periarthritic changes, which ultimately result in a diffuse sclerosis of the capsular and pericapsular structures.

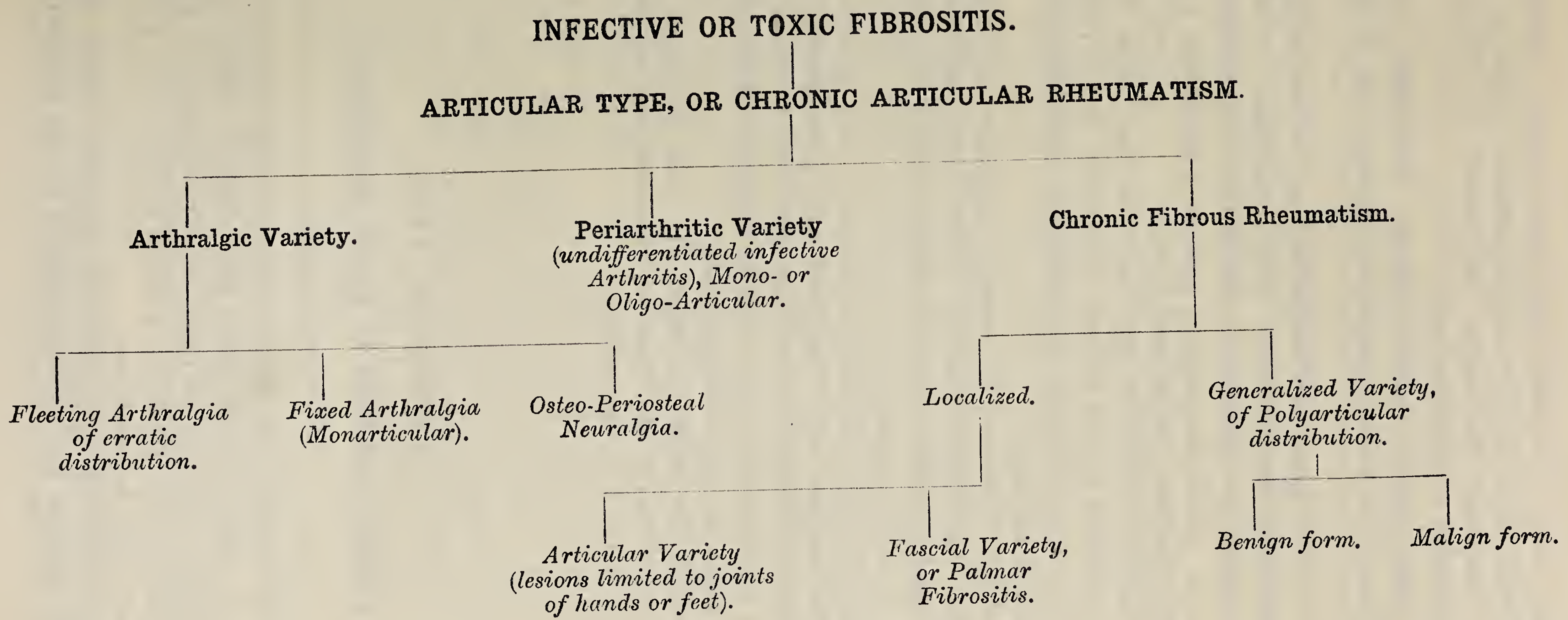
Now, in regard of the different degrees of severity displayed by the foregoing types, they are presumably attributable to variations in intensity of the causal infection or subinfection. The arthralgias, generally fleeting in character, are doubtless the expression of an equally ephemeral or attenuated infection, while the more acute and persistent periarthritic types are doubtless the outcome of the more intense infective processes.

The same diversity obtains in the last group, chronic fibrous rheumatism, in which the condition may be insidiously installed, years passing before it arrives at maturity. On the other hand, it may be established with comparative swiftness in sequence to a series of attacks of acute rheumatism, or, as we believe, repeated attacks of gonorrhœa or of reinfection from a smouldering process in the prostatic urethra.

Having got thus far, it is now necessary for us to approach this difficult question from another point of view—*the distribution of the articular lesions*—for, when analyzed, it will be found that all suggested classifications of chronic articular rheumatism are based upon these two features: the severity and arrangement of the arthritic manifestations.

Thus, in regard of the *arthralgic* type, a further differentiation may be effected between arthralgias of *fleeting* type and of *erratic* or *nomadic* incidence, and those of *fixed* type, which are generally *monarticular;* but both varieties display a penchant for the larger articulations.

In addition we can conveniently relegate to this group that type in which the pains, whether fleeting or fixed, are localized, not in the joints, but in the *shafts of the long bones or their periosteal investments*, and for which variety we would suggest the designation *osteo-periosteal neuralgia.*


INFECTIVE OR TOXIC FIBROSITIS.
ARTICULAR TYPE, OR CHRONIC ARTICULAR RHEUMATISM.
Arthralgic Variety.
Periarthritic Variety (undifferentiated infective Arthritis), Mono- or Oligo-Articular.
Chronic Fibrous Rheumatism.
Fleeting Arthralgia of erratic distribution.
Fixed Arthralgia (Monarticular).
Osteo-Periosteal Neuralgia.
Localized.
Generalized Variety, of Polyarticular distribution.
Articular Variety (lesions limited to joints of hands or feet).
Fascial Variety, or Palmar Fibrositis.
Benign form.
Malign form.

Passing now to consider our second group, *periarthritis*, it will be found that, in the undifferentiated forms of infective arthritis comprised thereunder, the lesions are always *mono- or oligo-articular* in distribution.

Our third variety, *chronic fibrous rheumatism*, admits of division into two main groups—a *localized* and a *generalized* variety.

The former is again subdivided into an *articular* and a *fascial* type, containing respectively those examples in which the arthritic lesions are localized to the joints of the hands and feet, and those in which the morbid process is restricted to, or predominantly involves, the palmar fascia.

The localized articular type has, we may state, been still further subdivided by the French physicians; but in the interests of simplicity we shall defer our detailed consideration of these to our clinical account.

The latter or *generalized* variety comprises all instances of *polyarticular* distribution, and we would distinguish two types: a mild or benign, and a severe or malign variety—*le rhumatisme chronique fibreux* (Jaccoud).

Needless to say, the differentiation of this group—chronic fibrous rheumatism—into localized and generalized, and the subdivisions therefrom, is somewhat arbitrary, as there are transitional or intermediate forms; but its retention offers advantages from the point of view of description.

Meanwhile the table on page 111 will perhaps serve to indicate more clearly the lines of classification permissible in the present state of our knowledge.

ARTHRALGIC TYPE.

Fleeting Arthralgia of Erratic Distribution.

Clinical Account.

Mode of Onset.—The usual history forthcoming is that in sequence to cold or exposure the subject, often of gouty habit, became conscious of pains in various parts of the trunk and extremities, accompanied in most instances by a feeling of malaise and slight feverishness.

The constitutional symptoms are generally slight, and such as may be present are usually referred to the gastro-intestinal tract.

The tongue is more or less covered with white viscid fur. Thirst is a prominent symptom, and commonly the patients have been for some time aware of an unpleasant taste in the mouth, feelings of distension after eating, with acid eructations and heartburn. The bowels are nearly always constipated, and, if inquiry be made, it will probably be found that for a long time previous to the attack their action had been unsatisfactory, demanding the stimulus of some laxative or aperient.

The urine is often scanty, but may be abundant, and it is almost invariably high-coloured, depositing on cooling an excess of urates.

Local Symptoms.—Pains are felt first in one limb or in one joint, and then in another limb or one or two joints of the same limb.

In other instances corresponding joints in opposite limbs are affected. For instance, it may attack both elbows, both ankles, or both wrists. In thus flitting from joint to joint, it may apparently simulate acute articular rheumatism; but its habit is rather to affect one, two, or at most three, to which it confines itself throughout the course of the disorder.

Although but few joints may be the seat of these fleeting pangs, the general nature of the affection is betokened by coincident but ephemeral neuralgic or muscular twinges in the shoulders, loins, or cervical regions.

Indeed, such an arthralgic condition is not uncommonly complicated or replaced by a similar painful affection of the muscles, or in the same way it may give place to sciatica or other type of neuralgic pain.

Having regard to the unbroken continuity of the white connective tissues which weld together the different parts of the body fabric, it could hardly be expected that the arthritic more than any other clinical type of fibrositis would be found in a pure form, and uncomplicated by any other manifestations of the same nature. And so it is at the bedside we find that the arthritic type trenches upon the muscular, and the latter frequently merges into the neuralgic.

To resume, the outward appearance of the joints is unaltered, there being no local heat, redness, or swelling, fleeting pains and stiffness being all that the patient complains of.

The slightest current of air blowing upon him is followed by aggravation of his uneasiness or by the appearance of fresh pains in parts hitherto unaffected.

Though in the daytime they may, if up and about, move with tolerable ease, their night's rest is frequently broken, their discomfort usually increasing as they gather warmth in bed.

In vigorous and fairly healthy persons such attacks may in a few days subside of themselves, or respond very quickly to appropriate treatment; but there is a strong tendency for them to recur again and again. Presumably, in these mild forms of joint disorder the fibrous elements sustain but a passing irritation by the circulating microbes or toxins, and leave no lasting trace of their action; but it is well to remember that these fleeting pangs are sometimes the harbingers of more or less severe forms of infective arthritis or periarthritis.

Fixed Arthralgia (Monarticular).

In examples of this nature the pain, instead of flitting from joint to joint, fastens obstinately upon some articulation, commonly the knee. It sometimes rises *de novo*, but more often is apparently a legacy bequeathed from one of those attacks of fleeting arthralgia just described.

In the latter instance, the persistence of the pain in one joint after the others have been forsaken generally indicates that in its case the morbid process has gone a step farther, and initiated a definite inflammatory change in the periarticular fibrous tissues.

In this event the presence of objective changes, local heat, tenderness, and puffiness, would suffice to identify the nature of the disorder; but when such evidences are lacking, we should be most chary of contenting ourselves with the diagnosis of simple arthralgia, for, as will be seen in a later section, the sources of fallacy are numerous.

Osteo-Periosteal Neuralgia.

In this variety, or, as the French term it, *rhumatisme chronique ostealgique*, the neuralgic pains, instead of being localized in the joints, are experienced in the shafts of the long bones—the femur, humerus, and more especially the tibia and ulna. But occasionally they are felt in the clavicle or sternum, and sometimes in the bones of the cranium, the affection, in short, showing a predilection for any bones thinly covered by integument.

As in the arthralgic form, the attacks are nearly always attributable to alimentary disturbances in conjunction with exposure to cold or over-fatigue. The subjects are usually highly sensitive persons, abnormally susceptible to toxic influences, as shown by their proneness to neuralgias of all sorts, and their liability to pruriginous eruptions of multiform character, these following commonly in the wake of some dietetic excess.

When questioned as to the seat of pain, they refer it to the bones, but sometimes to the actual marrow of the shafts. The related joints are neither infringed upon nor incommoded, and even at the height of a paroxysm of pain remain freely and painlessly movable.

The attacks begin suddenly, and generally during the night, the pains coming and going intermittently until morning, when they as a rule abate. They vary greatly in severity, but may be extremely violent, the intense aching recalling the "break-bone" pains associated with dengue, and which, indeed, as Rush in his classic description has pointed out, were at first deemed "rheumatic" in kind.

More often they are less severe, partaking of the nature of an indefinable uneasiness, lit up from time to time by sharper pangs.

Not the less distressing feature of the disorder is the restlessness it occasions. Rest in bed is impossible, and when the legs are attacked a veritable *anxietas tibiarum* is produced, the patient incessantly changing his position, until, spent with fatigue, sleep overtakes him. During the day the subject remains as a rule free from the more acute pains, though he may be conscious of slight stiffness, or of a sensation of soreness or bruising over the affected parts.

An attack of this nature may last only a few days, and especially, if a primary one, responds very quickly to treatment; but nevertheless it may assume a more troublesome and enduring form, with a tendency to exacerbations from time to time.

For precisely as in the arthralgic variety there sometimes supervenes a condition of periarthritis, so also in this osteo-periosteal neuralgia there may ensue a *chronic inflammatory change in the periosteum of the affected bones.*

In such instances it is frequently possible to detect in the more superficial bones—*i.e.*, clavicle or tibia—the presence of one or more soft elevations, which ultimately gradually grow harder and firmer in consistence. They are often prominent enough to be perceptible to the eye as well as to the fingers on running them along the part.

The skin over them is very rarely discoloured, but they are tender to the touch, sometimes exquisitely so, and, like most forms of so-called "rheumatism," are more sensitive and painful at night.

The *nodes or plaques* are undoubtedly the outcome of an inflammatory change in the periosteum, with resultant localized fibrous hyperplasia, and probably due to a local infective process. Still, it must be added that, in those rare examples in which these osteal pains are experienced in the phalanges, French physicians claim to have established by means of radiography the presence of uratic deposits at the site of the periosteal swellings.

Nevertheless, we incline to assign them an *infective* causation, and it is worthy of note, at any rate, that such states of osteoperiostitis have been observed to develop in the course of *acute articular rheumatism* and in connection with *typhoid fever* and *variola.*

If to this be added the frequency with which such periosteal swellings occur in *syphilis* also, we see that there is abundant presumptive evidence in favour of such an etiological conception.

In drawing to a close our consideration of these so-called "rheumatic" arthralgias and ostealgias, we would emphasize the fact that no hard-and-fast line can be drawn between these and the types of infective periarthritis that we are about to describe, for they merge by imperceptible gradations one into the other, and in the same way as a systemic gonococcal infection may at one time announce its existence by fleeting arthralgias, which later are replaced by a definite arthritis, so also may these undifferentiated arthritides be foreshadowed by similar arthralgic or osteal pains.

Periarthritic Type.

Synonym: Infective, toxic, or septic arthritis (of undifferentiated origin).

Clinical Account.

Introductory Remarks.—It is from this group of joint disorders that the bulk of examples of so-called "chronic articular rheumatism" is recruited, and even when all specific forms of infective arthritis have been excluded by bacteriological investigation, its content still remains imposing.

As our etiological section betokens, there is reason to expect that eventually many of these arthritides will be affiliated to germs of attenuated virulence; but from the practical point of view of diagnosis, and still more of treatment, it is urgently desirable that their infective nature should be more generally recognized than it is. Indeed, it would be well, when approaching these cases, if we carried always in our mind as a safeguard the axiom that *any or all infections may be complicated by arthropathies.*

In this way the possible causal significance of a carious tooth, a nasal or aural discharge, would be more swiftly brought home to us, and its treatment not postponed until a potential breadwinner has been perhaps irremediably crippled.

Mode of Onset.—This is very variable, and, having regard to the fact that the general features of the condition are so indicative of its infective nature, such diversity is precisely what one would expect.

For but a brief glance at the mode of installation of their analogues—the specific infective arthritides—very clearly shows that their onset also varies with the identity of the causal organism.

How abrupt may be the onset of a pneumococcal or, for that matter, of a gonococcal arthritis, and witness the measured manner in which the temperature of a typhoid arthritis reaches its fastigium, the chart presented reproducing precisely that typical of enteric fever.

The mode of installation of the undifferentiated infective arthritides is similarly diverse, but on the whole they display a very definite inclination to acuteness in onset.

Occasionally, however, they arise after an insidious or latent fashion, and in such subacute types there may be little or no pyrexia, despite the presence of objective changes indicative of recent, if low-grade, inflammatory change. Lastly, they may develop, so to speak, *gradatim* out of one of those subacute types of fleeting arthralgia which we have already dealt with.

In the more typical or acute forms, after a few hours of malaise, lack of appetite, headache, and perhaps wandering pains in back and limb, the temperature rises abruptly. Coincidently, pains fix themselves in the joints, and for the first few days in several articulations, leaving some and attacking others in a capricious or erratic fashion. It is during this brief initial period, when the pains are distinctly rambling in incidence, that confusion with acute articular rheumatism so very frequently occurs.

Generally this multiple involvement does not endure beyond six to ten days, and then the disease, as it were, withdraws from most of the articulations, fixing itself in one, two, or at most four, of those primarily implicated.

Indeed, it is perhaps the most characteristic trait of this type of joint affection that, after its first excursive stage has passed, it shows no tendency as a rule to involve any other joints. This is true even after weeks or months have elapsed during which the body temperature may be more or less continuously raised and of a septic or irregular type.

In attempting to explain this peculiarity, one can only suggest that it is in some way wrapped up with the life-history of the causal microbe.

Now, a glance at the bacteriological and experimental data previously outlined seems to indicate that, in the majority of cases of undifferentiated infective arthritis, the causal microbes are streptococci of attenuated virulence or slender vitality.

This is particularly well shown in the allied disorder, muscular rheumatism, where the organisms swiftly undergo lysis, and the resulting inflammatory changes are due to the irritation set up by their endotoxins, which are thereby released.

In other words, the responsible organisms are short-lived, and, applying this to the articular manifestations, it clearly follows that such joints as are to be involved will be implicated forthwith, and the causal germs having succumbed, there is as a rule no tendency for other articulations to be involved.

Contrast this with what takes place in gonococcal and other specific infections where the organism is long-lived, and is capable of surviving in the tissues indefinitely. In this case, either from fresh attacks or, more probably, from recurring absorption of toxins from the urethral focus, the joints are progressively involved, this continuing as long as the organism retains its vitality.

General Symptoms.—Here again the greatest diversity in intensity obtains. Presumably the clue lies in the degree of severity of the infection.

To take the mildest cases, attended as a rule by transient synovial effusion, in such the temperature is but slightly raised, the pulse but little quickened, the glands not noticeably enlarged, and the disorder swiftly passes away, leaving no trace.

Such examples at the bedside remind us of the mild and fleeting types of synovitis which accompany or follow the various exanthemata, measles, etc. They appear as a rule about the time when the skin or throat affection is on the decline. Some three or four days after the eruption has disappeared, they also clear up, leaving no trace, representing, as it were, the terminal expression of an infection whose germs have but a fleeting existence.

Turning to the more severe forms, the temperature runs high, varying from 100° to 103° F., and pursues a *septic or irregular* course. General malaise is marked, and the pulse-rate proportionately increased. In these instances, where the infection is presumably more intense, other features are superadded.

The *glands*, especially those in relation to the affected joints, become enlarged, sometimes not only palpably, but visibly so, and the spleen also undergoes appreciable swelling.

A *leucocytosis* during these acute stages is present, and in addition there is an increased percentage of hæmoglobin. Later, with the passing of the acute phase, this increase in the leucocytes

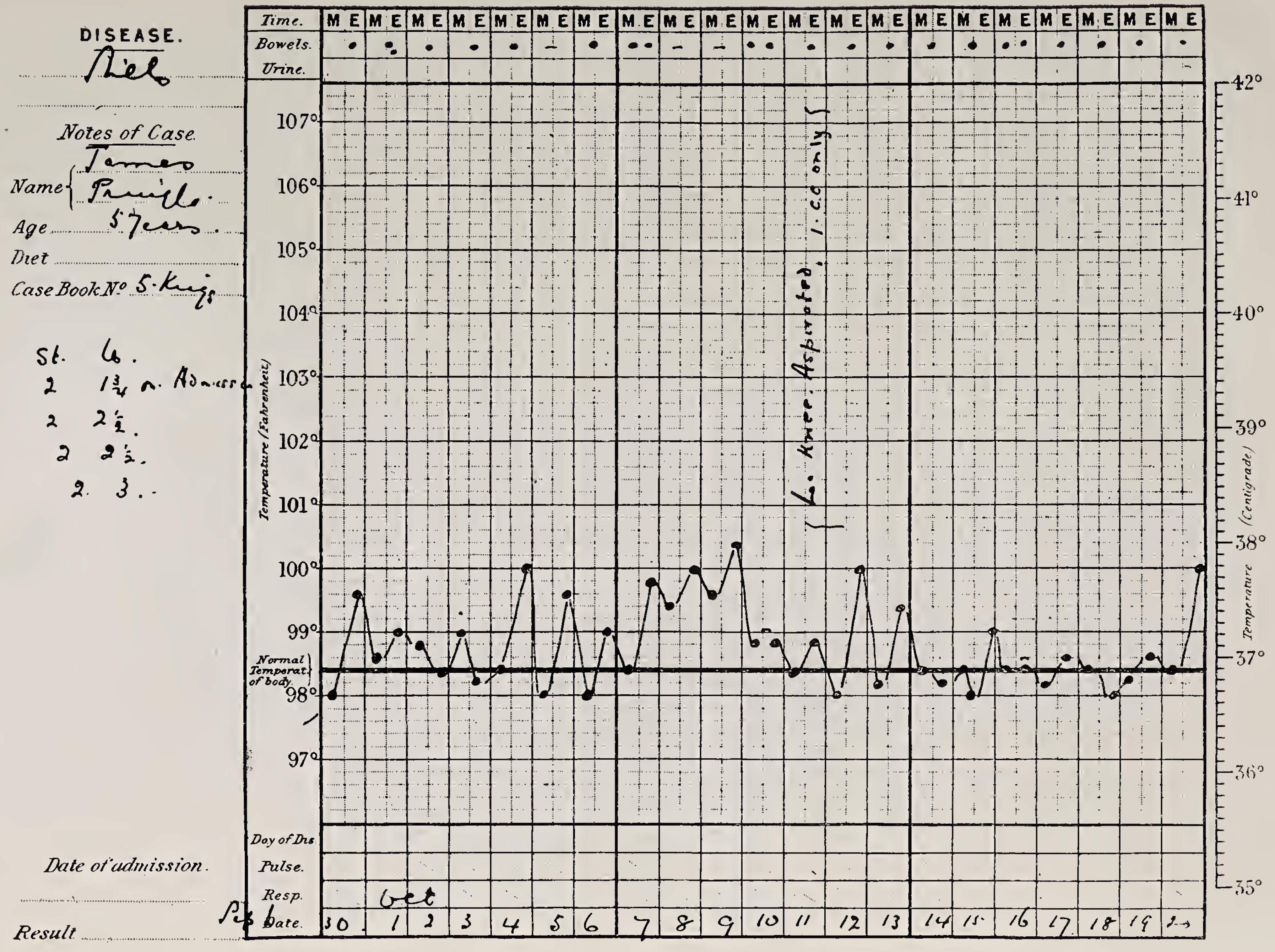


FIG. 14.—Chart showing irregular or septic course of temperature in a case of infective arthritis.

To face page 118.

is no longer obvious, and with a decline in the percentage of hæmoglobin a *secondary anæmia* develops.

The most notable changes in the *urine* relate to their bacterial content, of whose increase there is cumulative evidence by various observers. Several strains of streptococci and coliform bacilli have been observed, and in some instances the joint lesions have been favourably modified by the administration of vaccines prepared from these organisms.

Distribution of Joint Lesions.—While the disorder may be polyarticular and generalized, this is exceptional, the typical arrangement being a *mono-* or *oligo-articular distribution.*

The articulations most prone to be attacked are, in order of frequency: Knee, elbow, wrist, ankle, shoulder, and hip; but the metacarpo-phalangeal, phalangeal, sacro-iliac, and small articulations of the spine enjoy no immunity. In other words, the larger joints are the seats of predilection, and when the disease, after its primary multiple involvement, settles down in one articulation, the knee is the chosen site.

It is possible that the distribution may eventually be found to vary, as in the specific infective arthritides, with the identity of the organism. Each of the latter presents, as we know, its particular physiognomy, as evidenced by its choice of joints.

Thus, the gonococcus has its predilection for the wrist, knee, and sterno-clavicular; typhoid fever, the hip; post-scarlatinal rheumatism, for the phalangeal joints; and so on. But up to the present no such differentiation can be effected in the class under consideration, save only their family proclivity for affecting the larger joints.

Character of Joint Lesions.—Now, while from the clinical point of view this type of joint disorder may be said to affect a particular form of arthropathy—a *periarthritis*—at the same time it must be realized that this rule is not absolute.

Thus, quite comparable to what one observes in that most typical form of specific infective arthritis, the gonococcal, one may in different cases, or even at different stages of the same case, distinguish a variety of lesions.

To begin with, in the mildest forms the infection, of whatever nature, may assume the guise of a simple *arthralgia,* in which very acute pains are experienced at the site of the joints, and which are intensified by pressure or movement.

If of more severe grade, it may take the form of a *mono-* or *poly-articular synovitis.* In the former, which has a very pronounced predilection for the knee, there ensues a rapid effusion into the joint—in short, an *infective hydrarthrosis*—which, while it develops rapidly, is slow in resolution.

On the other hand, in the *polyarticular* type many joints are involved; the pains are moderate, the swelling more or less marked, and the inflammatory reaction to the microbial or toxic irritant is of variable intensity, according to the individual response.

Now, in regard of the foregoing types, it may be said that they represent what may be termed the milder phases of the infection, and this is especially true of the arthralgic and polysynovial types, which may clear up entirely in a few days, and leave no permanent trace, albeit they very commonly act as the forerunners of a definite periarthritis of plastic ankylosing character.

So much, then, for a general survey of the character and life-history, as it were, of the articular lesions in these undifferentiated arthritides, whose polymorphism is the exact replica of what we meet in specific forms of infective arthritis.

We now pass on to consider in detail the subjective and objective phenomena characteristic of these types of arthritis.

Local Symptoms and Phenomena.—The sole subjective symptom is, of course, pain; but only in very few cases is it spontaneous, persistent, and of high degree. More commonly it is a feeling of tension and discomfort, which only rises to the level of positive pain when the parts are actively or passively moved.

In this respect it contrasts markedly with the exquisite painfulness exhibited by joints, the seat of acute gout or acute articular rheumatism. The tenderness, albeit, is very marked, and this not only deep-seated, but there is also exquisite sensitiveness to the slightest contact. The larger joints being the most commonly involved, we shall first devote our attention to them, the objective changes being more clearly discerned in the superficial joints, such as the knee. Only in the very early stages is it possible to elicit signs of synovial effusion, which rapidly give way before the advancing periarticular involvement.

In outward appearance the swollen joint often shows an undue pallor save for the cutaneous veins occasionally seen to meander over its surface. Redness, if present, is usually of a dusky quality; but occasionally, when the phalangeal joints are affected, they appear much congested, with a somewhat angry blush.

The outline of the joint is generally enlarged to one or other side, but does not present the globular shape distinctive of intrasynovial effusion. Moreover, the swollen area does not as a rule fluctuate, though it has a distinct tendency to pit on pressure. At first the swelling is, of course, due to the initial synovial effusion, but later it is the outcome of the advancing infiltration of the subsynovial, ligamentary, and periarticular structures.

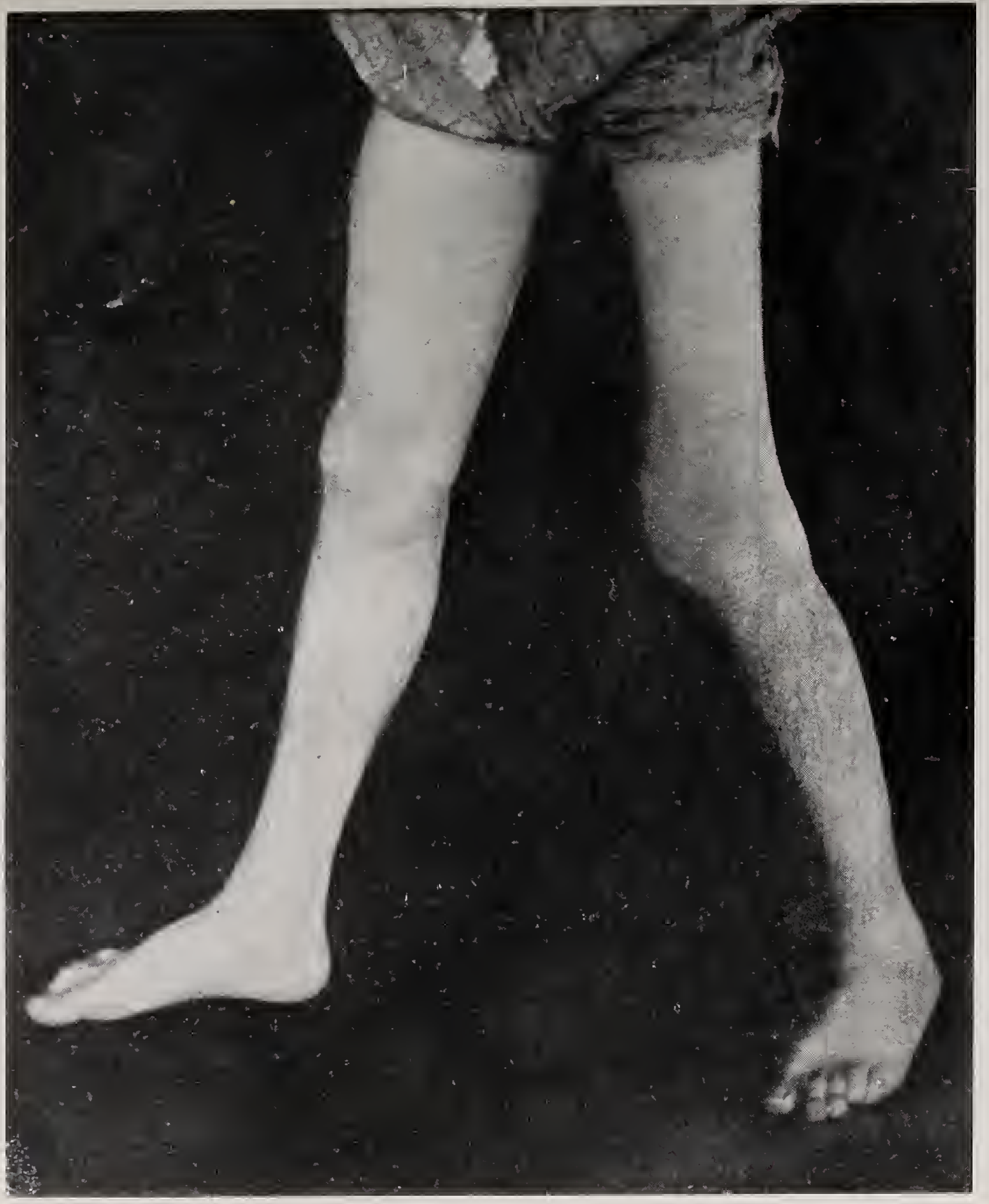


Fig. 15.—Infective arthritis of left knee, with marked atrophy of thigh muscles of same limb.

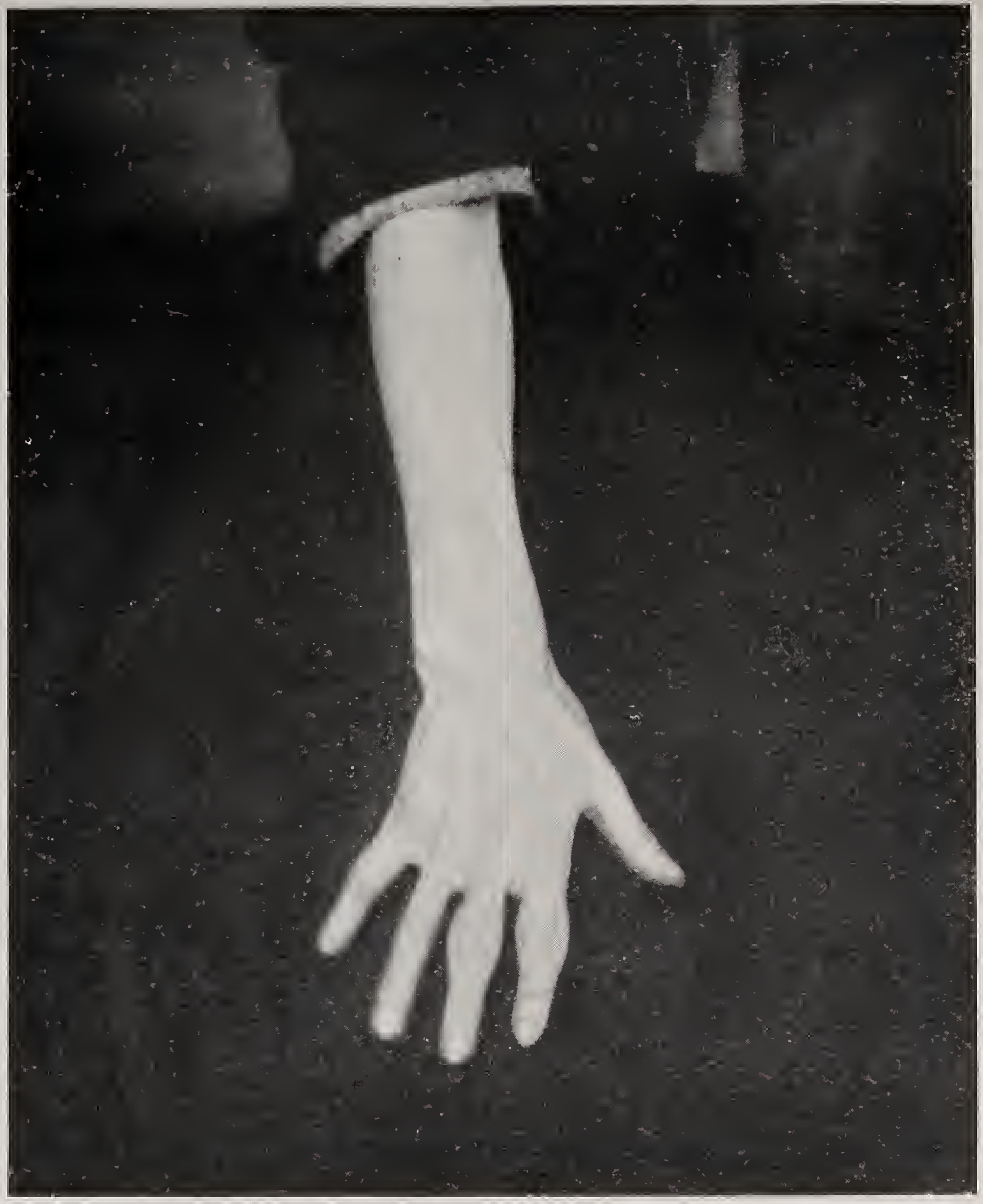


Fig. 16.—Hand of same patient, showing fusiform enlargement of mid-phalangeal joints of index and middle fingers.

To face page 120.

This periarticular swelling or œdema often extends beyond the actual boundaries of the affected joint. Where the knee or the ankle is the site, the parts below are often the seat of diffuse œdema and swelling.

The degree of swelling is, of course, not always so pronounced, and the enlargement is less marked in joints which have only been recently involved, or which the malady, after a brief sojourn, has deserted.

But in all instances where the joint disorder has exceeded seven or eight days in duration the periarticular site of the morbid process is clearly evident, and the doughy, formless, slightly pitting tumefaction sharply differentiates it from the circumscribed swelling of intrasynovial effusion.

The smaller joints of the hands, either the metacarpophalangeal or the phalangeal articulations, are sometimes involved. In this event they present, when well established, a distinct spindle form, a shape, unfortunately, for long deemed peculiar to rheumatoid arthritis.

This is, of course, quite erroneous, this particular outline being simply the outcome of infiltration of the capsular and pericapsular structures. But, unlike the rheumatoid hand, these joint lesions are not symmetrical, but of erratic distribution, being often confined to one knuckle or phalangeal joint, and this only on one side.

In some of these undifferentiated forms of infective periarthritis the brunt of the mischief falls not so much upon the capsular structures as on the related tendinous sheaths, and constituting to all intents and purposes a *generalized type of polytenosynovitis.*

We have an analogy in the specific arthritides, as witness the affinity of post-scarlatinal rheumatism for affecting the tendon sheaths of the fingers, not to mention the similar predilection of the gonococcus.

It is important to distinguish the swelling produced from that due to intrasynovial effusion. Thus, for example, in the wrist or ankle-joint distension or thickening of the tendon sheaths is characterized by these features.

The swelling is quite superficial, often bi- or tri-furcated, and its long axis runs parallel to that of the limb.

As opposed to this, in instances of effusion into either of these joints an enlargement ensues, whose long axis, instead of coinciding with that of the limb, runs transversely to it.

Apropos of this particular type, one may allude to a case recently seen by one of us in consultation with Dr. Almond. The patient, a young woman, presented several swellings of this nature on the dorsum of the foot and the palmar surface of the hand and wrist. The palmar bursæ being obviously thickened, these were removed, the contents subsequently inoculated into a guinea-pig, and the tuberculous nature of the affection established.

Formerly a very favourite differentiation of chronic arthritis was its division into two main groups—*tuberculous* and *non-tuberculous*.

This, of course, was a very convenient generalization when by " tuberculous joint affections " was meant simply the so-called " tumeur blanche."

But if it be conceded, as Poncet and others now claim, that there is an attenuated variant of tuberculous infection which may produce a variety of articular lesions, then our conceptions on this point need revision. Now, Poncet claims that one variety of this attenuated form of tuberculous affection is of the nature of a chronic polysynovitis, and the case before alluded to would seemingly come under this category.

Without committing ourselves to the sweeping assumptions made by the French physicians as to the frequency of this so-called " chronic tuberculous rheumatism," one must admit that every now and again in our experience cases crop up in which articular lesions are met with in association with visceral and, as we have observed, cutaneous lesions of tuberculous nature.

Course and Termination.—In the more benign types complete resolution and absorption of the inflammatory exudate into the periarticular tissues may occur.

But in other cases, not necessarily of the severe type, when the acute stage is over, the joint condition does not clear up satisfactorily. Commonly, but not invariably, it is the knee that is the seat of such lingering disability. The joint, though it diminishes, does not regain its normal size. It feels weak and insecure, and stiffness is much complained of after prolonged rest or excessive exertion; while occasionally symptoms of pseudo-locking, with difficulty in completely extending the joint, occur.

Such symptoms are indicative of *intra-articular* mischief—viz., thickening or villous overgrowth on the part of the synovial membrane, or possibly detached plaques of fibrin, such constituting an impediment to the free motion of the joint, which, of course, will persist until their removal or disappearance under treatment.

More commonly, however, in keeping with the predominantly *periarticular* site of the morbid process, the outlook is shadowed by the progressive condensation and sclerosis of the

PLATE I.

Infective Arthritis: Local Symptoms and Phenomena.

First metacarpo-phalangeal joint alone involved, though knees in same patient were also attacked, but had recovered. Note swelling of affected joint and inflammatory blush of overlying skin.

To face page 122.

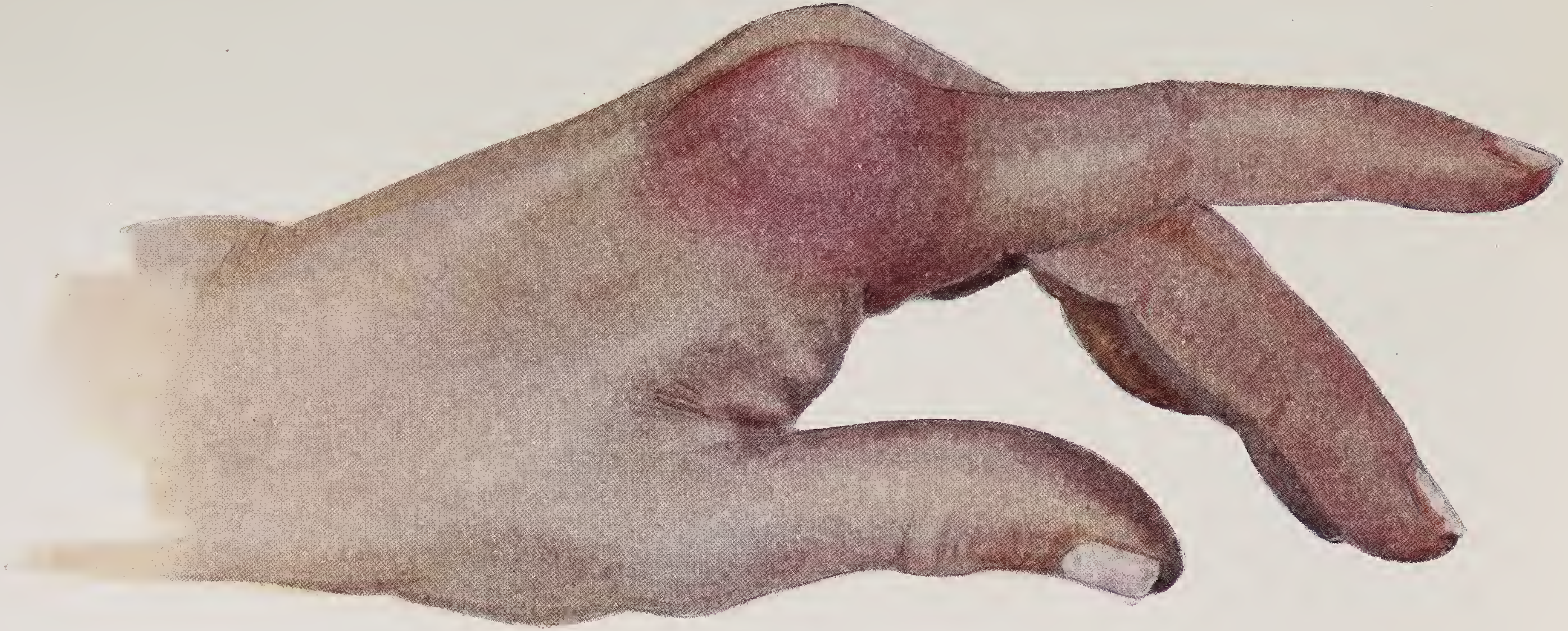


Plate I.

capsule and ligamentary structures—the remote result of the long-continued low-grade inflammatory change, objective tokens of which are easily distinguished on palpation as areas of induration of diffuse or discrete kind, which are extremely sensitive to pressure.

This shrinkage of the tissues surrounding the joint is a permanent cause of stiffness and discomfort, and the limitation of movement thus imposed is accentuated by the coincident and similar changes induced in the related muscular and tendinous structures.

Thus, periarthritis of the knee is frequently complicated by contracture of the hamstring tendons, which become knotty and indurated to palpation, while coincident retraction of the posterior portion of the capsule leads to more or less flexion, with corresponding impairment in usefulness of the limb.

These results are, of course, more pronounced in those cases where no care has been taken to insure the requisite immobilization of the joint in the extended position during the acute stages. In these neglected cases the bursæ are sometimes involved in the morbid process, and while in the earlier stages they may be enlarged and soft, later they become hard and unyielding.

This progressive sclerosis of the joint capsule and periarticular structures constitutes, so to speak, the end-product of this pathological process—periarthritis—and furnishes the clue to the essential chronicity of the affection.

While taking the knee as our type, needless to say, the same untoward consequences are but too apt to ensue in other articulations, and taken *en masse* they constitute the bulk of the joint disorders that pass muster as examples of chronic rheumatism. Not the least painful feature of these cases is the fact that the malpositions and crippledom imposed are unfortunately very much the outcome of belated realization of their true nature, with consequent lack of adequate supervision during the acute stages of the malady.

Before drawing to a close our clinical picture of the life-history of these undifferentiated varieties of infective arthritis, we must allude to the fact that occasionally we have noted the coexistence of such lesions with *Graves's disease* or *exophthalmic goitre.*

The cardinal symptoms of Graves's syndrome, whether of complete or incomplete type, may precede, accompany, or follow, the appearance of the articular lesions. The occurrence of hyperthyroidism in this association, while it complicates the general outlook of the case, does not, as far as we have been able to ascertain, appreciably influence the usual course of the articular disorder. But the somewhat frequent coexistence of these two maladies may, we think, be taken to constitute another link in the chain of evidence in favour of the infective origin of exophthalmic goitre.

Chronic Fibrous Rheumatism.

This, as before pointed out, admits of a division into two main groups—a localized and a generalized form—each of which may again be subdivided.

Localized Variety.—This may be differentiated into an articular and a fascial form.

The *articular* type is restricted to the knuckle and finger joints, and in our experience more especially to the former. Its development is most insidious, and this type of chronic articular fibrositis is generally met with in miners, gardeners, coachmen, or labourers engaged in severe manual toil amid unfavourable surroundings.

In regard, however, of this articular form, our French confrères claim to have effected a still further differentiation, which is based partly on assumed etiological variations, and partly on a more exact localization of the articular lesions in the several phalangeal joints.

According to them, special types of this " chronic rheumatic arthritis " are to be met in association with dilatation of the stomach, chronic interstitial nephritis, and chronic affections of the biliary passages.

Thus, Bouchard noted in the subjects of *gastric dilatation* that an indolent enlargement of the mid-phalangeal joint was comparatively common, and apparently the outcome of a periarthritis so painlessly installed as to be readily overlooked.

It does not lead to ankylosis, nor are the movements of the joint incommoded, while there is an absence of creaking or of any inflammatory reaction. The condition waxes and wanes in accordance with the variations of the gastric disorder.

Teissier and Roque maintain that it is frequent in all forms of dyspepsia, whether gastric or intestinal, and these observers, like Bouchard, attribute it to an auto-intoxication, the outcome of acid fermentation.

Commonly the lesions are limited to the four fingers of the two hands, but sometimes they invade the thumb and likewise the wrist ; while in isolated instances an arthritis of the sterno-clavicular joint is met with.

The variety associated with *chronic interstitial nephritis* and arterio-sclerosis has been the object of special study by Lancereaux.

The salient feature or groundwork of this type would appear to be the widespread arterial degeneration. This, while it is evidenced sometimes by aortitis or aneurysmal dilatation of the larger trunks, appears to affect in a special manner the renal arteries, creating in process of time a renal sclerosis, to which the subjects eventually succumb.

An interesting feature of these cases, noted by Lancereaux, is the presence of presternal œdema and pseudo-lipomatous swellings which make their appearance below the clavicle.

As regards the joint lesions, the special peculiarity would appear to be their predilection for the lower limbs, especially the toe-joints, the deformities of which may be as pronounced, if not more so, than those met with in the hands.

The morbid changes, as in the former type, are apparently confined to the periarticular tissues, as radiography does not reveal alterations in the bone or cartilage.

The form associated with *chronic infection of the biliary passages* was first isolated by Gilbert and Fournier, whose researches have been amplified by Lereboullet. In this variety there develops a gradual enlargement of the last phalanx, which may readily be confused with Heberden's nodosities; but Gilbert, Chatin, and Cade have ascertained by radiography that the soft parts only are involved, the condition of the phalanx approximating to that met with in Marie's pulmonary osteoarthropathy.

In rarer instances there is an enlargement of the mid-phalangeal joint, which exactly reproduces that met with in gastric dilatation—*le campodactylie de Bouchard.*

In reviewing these special localized forms, it does not appear to us that the articular lesions, either in their character or site, can claim to be distinctive of the disorders with which they are respectively associated.

The chief value, to our mind, of such differentiation is that it enlarges our conception of the joint disorder, and throws a sidelight, as it were, on the general characteristics of these subjects—an aspect of these cases to which, perhaps, we are not sufficiently alive.

That gastric and intestinal disorders may occasion joint enlargements as a consequence of subinfection is, as may be seen by a reference to the chapter on General Etiology, at least highly probable.

On the other hand, the association of joint lesions of this nature with arterio-sclerosis may perhaps be explicable by coincidence, as the age incidence of both these affections incline to the later decades of life.

But from another point of view the renal and likewise the biliary types possess interest, for be it remembered that in both instances the changes induced in the liver and kidney are of the nature of *chronic interstitial fibroses*, as evidenced by renal and biliary cirrhosis.

Now, the changes in the periarticular tissues are precisely of the same nature—viz., a fibrous hyperplasia—and one is tempted to hazard the view that possibly they are local manifestations of a general tendency to interstitial overgrowth in response to a low-grade organism or its toxins.

From this point of view, therefore, we think that the generally meagre descriptions accorded these localized types of chronic rheumatism might be profitably amplified to the extent of including a reference to their frequent association with the foregoing diseases.

Fascial Type.—While the fibrous or aponeurotic structures in various parts of the body are prone to be implicated in "chronic rheumatism," there is only one localized form which has been raised to the dignity of a special affection—viz., the palmar fibrositis associated with the name of Dupuytren.

Etiology.—Up till quite recently regarded as essentially a surgical disorder, it found no place in medical textbooks; but there is reason to believe that it may be related to the rheumatic or gouty diathesis.

Thus, Gowers believed gout to be a powerful factor in its production, and French physicians, notably Menjaud, uphold this hypothesis. Luff, on the other hand, denies it any connection with gout, and regards it as an "occupational localized fibrositis."

In a recent Home Office report on its marked incidence among lace-workers, Collis and Eatock elicited indications of a rheumatic or gouty diathesis in 21 per cent. of the cases aged forty years and over, but, notwithstanding, were unable to satisfy themselves that these figures established a definite correlation between the affection and these constitutional tendencies.

Excluding the well-ascertained cases due to congenital malformation, they attributed causal potency to definite traumatisms and the allied influence, chronic and localized pressure on the palm.

Thus, in the accompanying illustration of the disorder the subject showed definite gouty stigmata. The man was a working jeweller, and had for many years used a hand-drill.

We have met with the disorder also in miners, gardeners, and

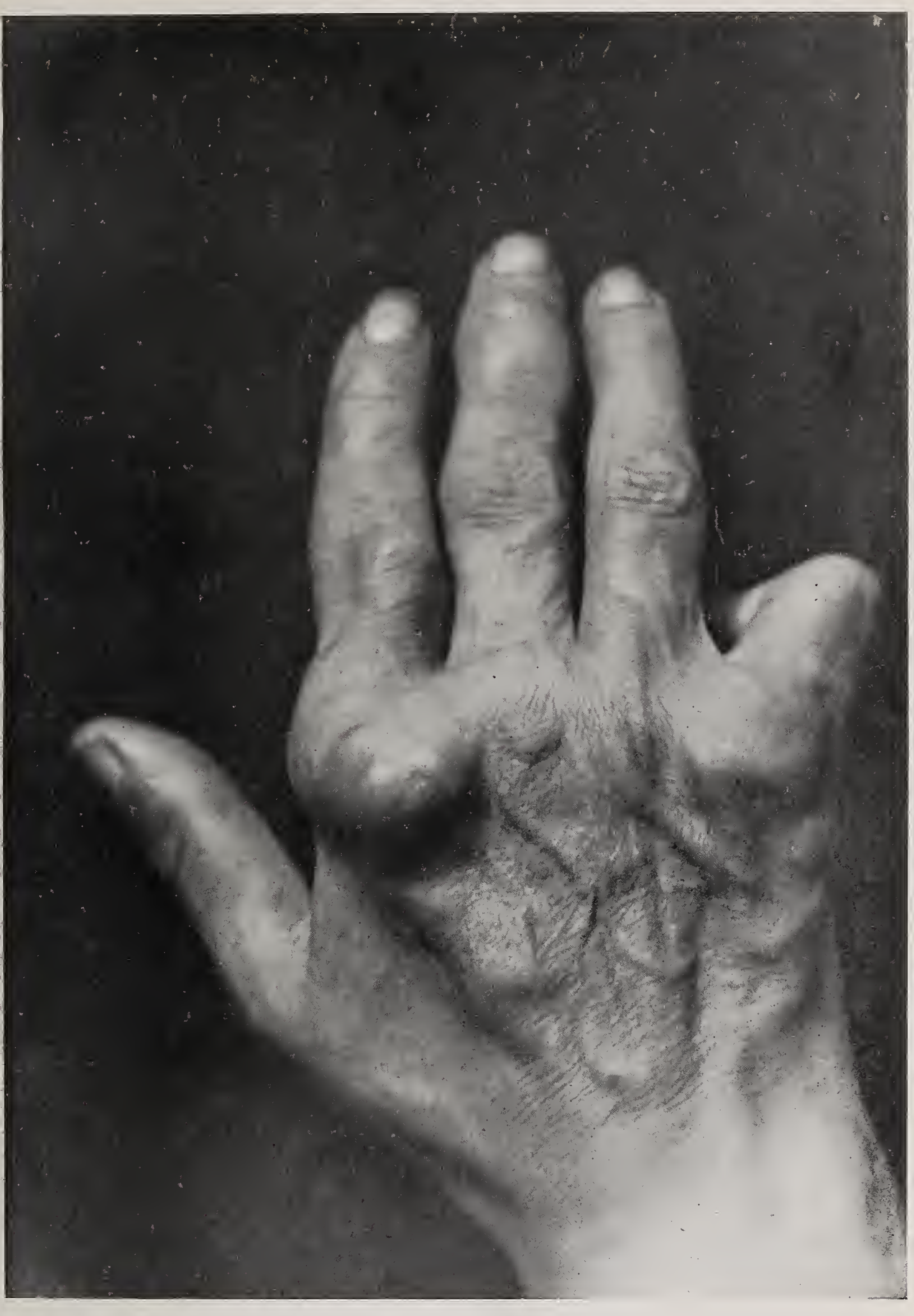


FIG. 17.—Palmar fibrositis, with Dupuytren's contracture of little finger, in a person, the subject of gout. Note tophaceous swelling in dorsum of hand near first metacarpo-phalangeal joint.

To face page 126.

others whose occupations entailed constant and unremitting pressure on the palm by their picks and shovels.

Its marked prevalence among lace-workers was by Collis and Eatock attributed to chafing and pressure of the palm through constant manipulation of the levers and wheels actuating their machines.

No age seems immune, but, excepting congenital cases or those in whom there seems to be a family predisposition, the disorder appears to be met with most commonly in persons of twenty-five years and upwards.

In reviewing these suggested etiological factors, if we exclude the congenital cases, the question resolves itself into one of *gout* or *localized pressure*, or these causes in combination.

The point is obviously one incapable of definite decision, and our own opinion is that, while a gouty or rheumatic diathesis does predispose to inflammatory overgrowth of fibrous tissues, these factors cannot of themselves evoke the more severe forms of the affection, save only if reinforced by constant localized pressure or friction.

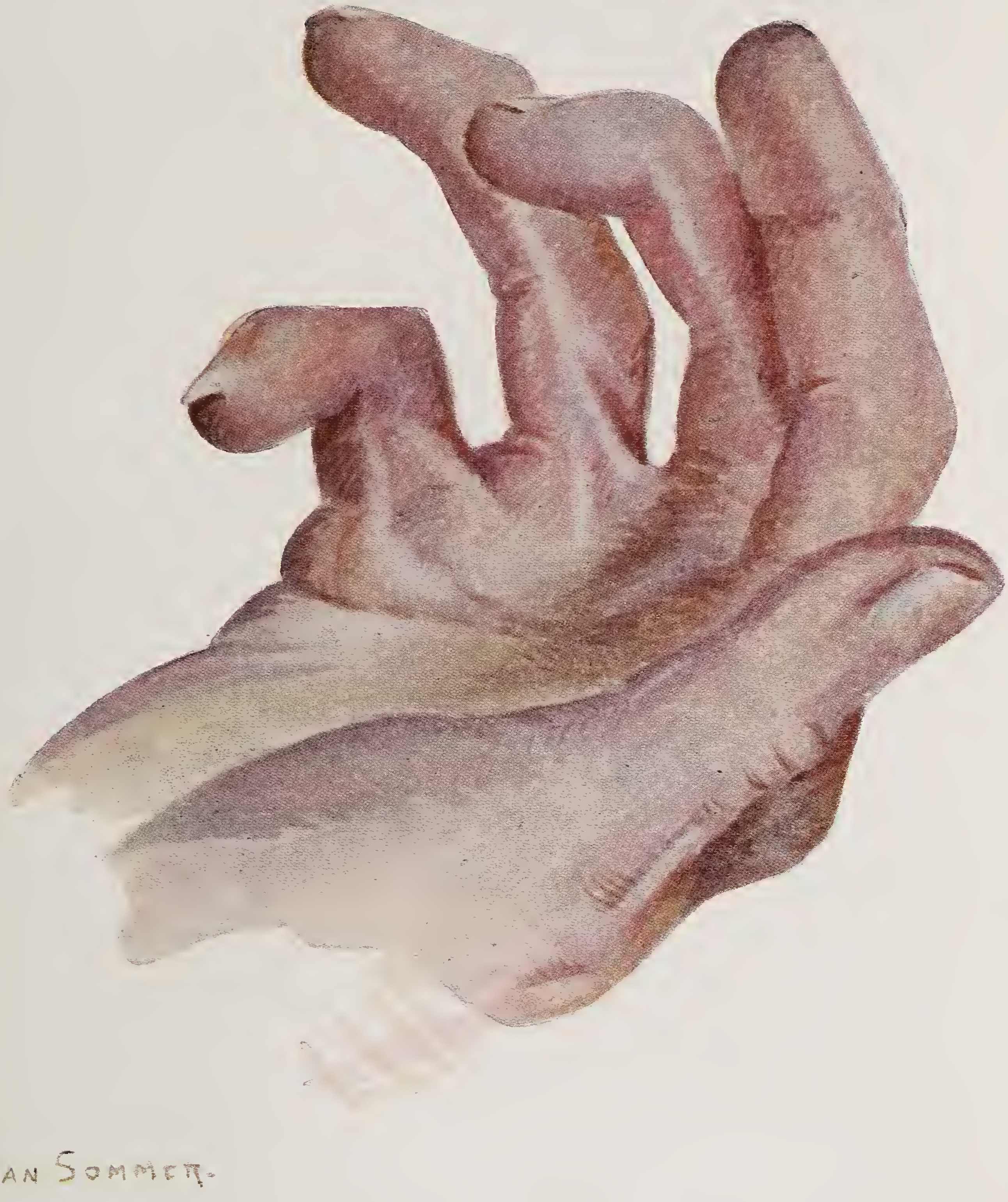
But to those who would, on the one hand, deny any influence to a gouty or rheumatic diathesis, and, on the other, would exalt pressure as an all-sufficient cause, the following points are worthy of consideration:

In the first place, the bilateral distribution of the affection does not appear to suggest the predominance of a local cause, such as pressure, for, if examined carefully, though the disease may be advanced in the one hand, nodules in the palm of the other will usually be found.

Now, the asymmetry in the degree of the affection is probably explained by the fact that the hand showing the more advanced stage of the affection is probably the one chiefly used in handling the tools.

Under this explanation, the influence of pressure drops from the position of a proximate or essential cause to that of an exciting or determining agent. One is the more disposed to take this view in that equally marked retractions of not only the palmar, but also of the plantar, aponeuroses are to be met with in those malignant forms of chronic rheumatism associated with the name of Jaccoud, and in which the factor of pressure does not intrude its influence.

Clinical Features.—The chief characteristic of the affection is its extremely insidious approach, of which the first appreciable change is adherence of the skin of the palm at the site of the natural grooves, and its intimate blending with the underlying fascia.



VAN SOMMER.

Plate II.

terminal, phalangeal joint. They may or may not occasion pain, and, when present, it is usually aggravated by movement, and also, of course, by injury.

Generalized or Polyarticular Variety.

Of this widespread form of chronic fibrous rheumatism, two varieties can be clinically distinguished: a simple or benign, and a severe or malign type—*le rhumatisme chronique fibreux.*

Benign Form.—While met with occasionally in young adults, its onset is more commonly postponed to the middle and later decades of life.

The personal history discloses nothing definite, the subjects, with a striking monotony, ascribing it to physical and mental exhaustion, laborious occupations entailing exposures to chill, or, failing these, a damp house, a damp bed, or a damp sheet.

Some, on being questioned, will recall a history in early life of rheumatic fever, and occasionally a cardiac lesion remains in evidence thereof; but equally commonly some valvular defect is present without this precedent. Its début is insidious, and the malady, essentially chronic, instals itself without any acute phenomena.

In distribution it is as a rule *polyarticular*, but symmetry of the lesions is not invariable, a gradual invasion of the articulations taking place, the larger joints falling a prey before those of the hands, fingers, and toes; while in some instances the spinal articulations are to a greater or less extent invaded.

Pain is not a prominent symptom in this milder form, but rather stiffness, the patient being chiefly concerned by the loud cracking of his joints, which ensues on the resumption of movement after a period of quietude. Such audible creakings follow any change of position—rising from table, mounting the stairs, or turning in bed.

They cannot be produced voluntarily, nor do they often follow each other quickly, being only evoked after the joint has been at rest some time. If, as often happens, it does not proceed beyond this stage, the condition hardly amounts to a disease, but rather falls under the head of an infirmity.

Unfortunately, it does not always pursue so mild a course, but subacute exacerbations of pain and stiffness, lasting weeks or months, may follow the incidence of chill, damp, or overexertion.

Under such circumstances the slowly progressing fibrositis of the joint capsules proceeds apace, and, the periarticular tissues ultimately becoming profoundly altered, the deformities distinctive of the graver type are eventually established.

The pain during such exacerbations is of the usual wearying character, often aggravated by heat, though mitigated by friction.

With exercise, the pain and stiffness, at first augmented, tend to pass off, though prolonged exertion invariably exacts its aftermath of renewed aching. In this way the symptoms persist indefinitely throughout long years, winter and spring extorting their usual toll of increased aches and pains.

Despite the harassing nature of the affection, the subjects are otherwise often vigorous and healthy, and not infrequently they reach extreme old age.

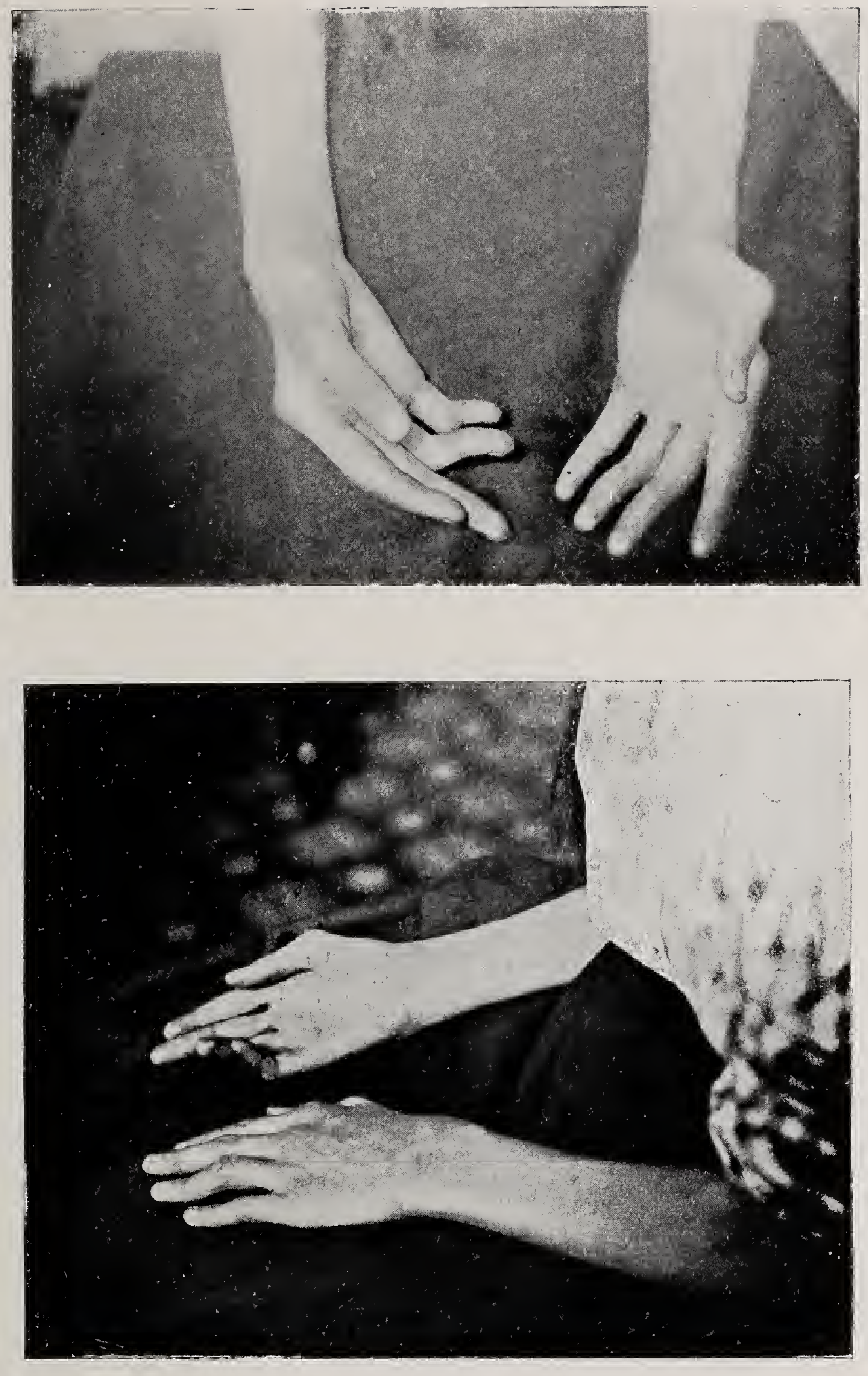
Malign Form—Jaccoud's Type.—It is in this more than in any other variety that the strongest evidence of any alliance between the acute and chronic types of rheumatism is forthcoming. The condition may develop out of acute or subacute articular rheumatism, and the cases that arise in this manner pursue a relatively rapid course.

In the classical instance recorded by Jaccoud, the subject, a young man, had passed through six attacks of acute rheumatism, the first four of which had subsided without leaving any joint changes, though the severity of the disease was attested by residual cardiac lesions. The two subsequent attacks, though less acute, were more prolonged, the fifth lasting no less than six months. It was during their progress that the small joints of the extremities became affected—a state of things aggravated by the sixth onslaught, which left them permanently distorted and painful. Coincidently, the same periarticular changes were installed in both elbow-joints.

In the light of such a striking example, it is difficult, if not impossible, to combat the conclusion held by some, that this condition of chronic fibrous rheumatism is one of the modes, though very exceptional, in which acute articular rheumatism may terminate.

At the same time it must be recollected that in the benign type just described the disease is chronic *ab initio*, though ultimately the condition produced is almost indistinguishable.

But, leaving this question aside, we may say that, irrespective of its mode of origin, whether acute or chronic, the earliest symptoms which mark the initiation of its periarticular changes are pain and stiffness. These are naturally more severe in the small joints of the extremities, which in the majority of the cases sustain the brunt of the malady. Just at first the distorted position imposed on the fingers admits of voluntary correction; but little by little this power is lost, and though they still allow of passive replacement, yet, when released, they spring back to their former state of malposition.



Figs. 18, 19.—Deformity of fingers following chronic rheumatism. Subject, girl of sixteen. Condition developed out of previous attack of acute articular rheumatism.

Right hand: Note flexion at metacarpo-phalangeal and proximal interphalangeal joints, with overextension at distal joint of ring and little fingers.

Left hand: Note hyperextension of metacarpo-phalangeal and distal interphalangeal joints with flexion of the proximal interphalangeal joints of the three inner fingers.

(*Reproduced by kind permission of the Author from Symes' "Rheumatic Diseases," Plates A and B.*)

To face page 130.

In well-marked instances the hands present a very characteristic appearance. Thus, the hand, and more especially the fingers, are deflected to the ulnar side, while the palm is hollowed out and fixed in a position of semiflexion. The proximal phalanges, through the retraction of the palmar aponeurosis, are flexed on the metacarpal, while the terminal and mid-phalanges retained in forced extension are luxated upon the proximal. It thus happens that they project upon the palmar surface, and present a concavity on the dorsal aspect of the fingers. Closer examination shows that the excavated palm is held *in situ*, and bridled, as it were, by the retracted slips of the palmar aponeurosis, which stand out in bold relief on the palm when any attempt is made to flatten it out.

The picture presented, indeed, is almost an exact replica of that we are accustomed to associate with marked examples of Dupuytren's contracture, and which, as we have shown, many regard as a localized type of chronic fibrous rheumatism.

To resume, the distortions of the fingers result solely from a displacement of their articular surfaces, these being maintained in their malposition by the retraction of the periarticular fibrous layers, thus imparting to them an aspect of ankylosis. The same deviation and malposition is met with in the feet, but the resulting concavities and convexities are presented in an inverse manner.

One feature deserves especial mention—that is, the thumb and the big toe do not participate in the malposition, owing to the fact that no slips pass to them from the palmar and plantar aponeuroses.

For a long period, indeed, it was thought that the distortion of the fingers was solely due to retraction of the palmar aponeurosis; but, as Goyrand of Aix has shown conclusively, on this basis the malposition of the middle and terminal phalanges could not be explained, for the expansions of this structure, although they extend to the first phalanges, are not prolonged to the distal, whose immobility can only be accounted for by the extension of newly-formed fibrous bands to their bases.

This overgrowth and condensation of the periarticular fibrous tissues, indeed, dominates the whole clinical picture, for at the articular ends of the bones there are no appreciable changes to be made out, no enlargement, and no osteophytic outgrowth.

We see, therefore, that this generalized or polyarticular type differs only in degree and extent from the more localized mono- or oligo-articular forms.

As further proof of the continuity that prevails in the sphere of so-called "chronic rheumatism," we may add that these sufferers are often troubled by recurring bouts of *muscular* *fibrositis*, with subsequent establishment of fibrous nodules in the interstitial tissues.

Occasionally, also, the *periosteum* is marked by fibrous thickenings, and even the *bursæ*, more particularly the subacromial, participate in this fibrosis.

The *neuralgias*, also, which from time to time add to their discomfort, are but another expression of the same tendency to excessive fibrous hyperplasia, localized in this instance in the sheaths of the affected nerves.

Again, there are not wanting indications that the internal organs may also become involved, for, apart from cardiac lesions affiliable to previous attacks of acute rheumatism, we have to remember that *valvular defects, due to slow sclerotic changes*, are by no means uncommon.

As to the significance of these latter, opinions differ, some regarding them as an essential part of the disease, others holding that they are only associated phenomena, and not referable to the same etiological factors as the articular manifestations.

Certain French authors, for example, maintain that these cases frequently develop a special form of *endarteritis*, which they claim to be due to the " rheumatic " poison.

To our mind, indeed, there seems no inherent improbability in their contention that the fibrous tissues of the vessels and valves participate in the morbid process, which is essentially of the nature of a chronic interstitial fibrosis of diffuse distribution.

In conclusion, it will have been noted that this fell disease is only in isolated instances the outcome of a series of attacks of *acute rheumatism*, and we have still to account for the genesis of the majority of the examples. A *gonococcal* infection is, we believe, responsible for some cases, but in the large residue of instances the etiology remains obscure. We may, however, remark on the fact that *digestive disturbances* are common in this association, and the tendency to recurring attacks of *tonsillitis*, *pharyngitis*, and *rhinitis* is also very pronounced.

We are, therefore, tempted to hazard the suggestion that possibly all these various disorders of the gastro-intestinal canal constitute foci of *chronic infection or subinfection*, which by their long-continued and cumulative action ultimately establish this, the most malign form of so-called " chronic articular rheumatism."

CHAPTER VI

DIAGNOSIS

General Considerations.

In approaching this, our first effort at diagnosis in the sphere of "chronic rheumatism," it is well to realize that there is a vast difference between a merely *topographical* as opposed to an *etiological* diagnosis in any example of the disorder. Thus, for instance, but a small measure of clinical acumen is needed for the bare recognition, as such, of a periarthritis, or, for that matter, a torticollis or a sciatica; but it is another and infinitely more difficult matter if we essay the task, as we should, of establishing the essential or proximate cause of any one of these manifestations.

Now, as we have seen in our section on General Etiology, the factors responsible for the production of any and all forms of chronic rheumatism or fibrositis are in the main identical, and so it follows that, whether we are dealing with an arthritic, muscular, or neuralgic type, we must pursue the same line of investigation if we would detect its hidden cause.

This being so, we have decided to interpolate here a section on the etiological diagnosis of chronic rheumatism, and, to save reiteration, we would at this period state that the same method of inquiry will have to be followed, not only in regard of the *arthritic*, but also of the *muscular* and *neuralgic* types of fibrositis respectively.

Etiological Diagnosis.

Presupposing that the subjective symptoms and objective signs are compatible with a so-called "rheumatic" affection, we must proceed to establish its probable cause.

With this object in view, we should, in the first place, scan both the personal and family history for any evidence as to the metabolic trend of the individual, whether in the direction of a gouty or a so-called "rheumatic" diathesis. The ancestral story often proves indefinite, but not infrequently we may glean from the patient's past an account of a classical arthritic outbreak, or, better still, a tophus may bear silent though unerring witness to this taint. But even in the absence of such candid avowals, we must be chary of excluding the possibility of a *gouty* factor when the patient's history reveals previous attacks of migraine, asthma, eczema, glycosuria, or a disposition to obesity, not overlooking at the same time the significance of heightened blood-pressure or a cardiac lesion of degenerative type.

In default of such leanings, we should search for any indications there may be of a *rheumatic* diathesis. A previous history of acute articular rheumatism is, as we have before pointed out, rarely forthcoming; but occasionally cases of this nature, after a more or less prolonged subacute stage, pass into an indefinite chronic form—*le rhumatisme chronique fibreux.* More commonly we can elicit an account of antecedent attacks of localized fibrositis, lumbago, sciatica, stiff-neck, and so forth.

Nor should we forget even in these instances to note the presence or absence of cardiac lesions or fibrous nodules, not to speak of a history of chorea, erythema nodosum, or other disorder commonly held to be rheumatic in nature.

Presuming all definite signs of a gouty or rheumatic diathesis to be lacking, we should next search for any evidence of *infection.*

Because of its marked penchant for fibrous tissues, we should, in the first place, exclude a *gonococcal* infection, and, failing this, influenza, syphilis, or any of the zymotic disorders prone to be followed by joint affections.

When the existence of such exact etiological factors cannot be established, our next step will be the detection of any abnormal condition which may react injuriously on the well-being of the organism. In pursuance of this end, we should, in the first place, search for any *localized foci of infection.* Here the mouth and its accessory cavities first call for examination in regard of oral sepsis, pyorrhœa alveolaris, aural or nasal discharges, not forgetting tonsillar and pharyngeal disorders, as well as local affections of the rectal and genito-urinary passages in both sexes.

Should our search prove barren in this respect, we should note the presence of *functional derangements of the alimentary canal or its accessory glands.* More commonly, the symptoms present are those of intestinal indigestion, with, as a prominent feature, constipation, and in marked cases pigmentation or staining, cold feet and hands, headache, irritability, depression, and drowsiness.

The limitations of our knowledge are such that exact diagnosis of the site of subinfection or toxic absorption in any given case of this nature is frequently a matter of the utmost difficulty,

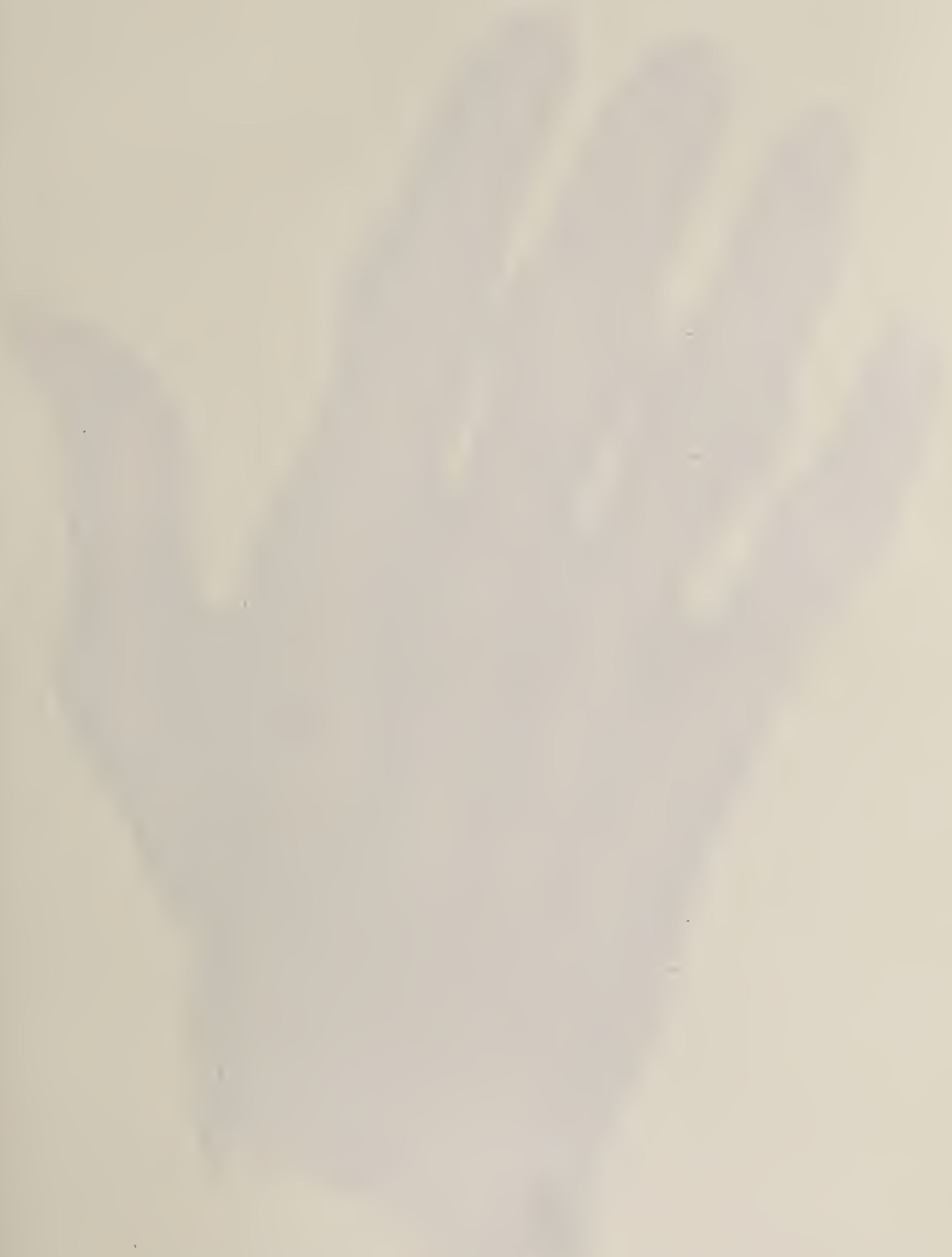
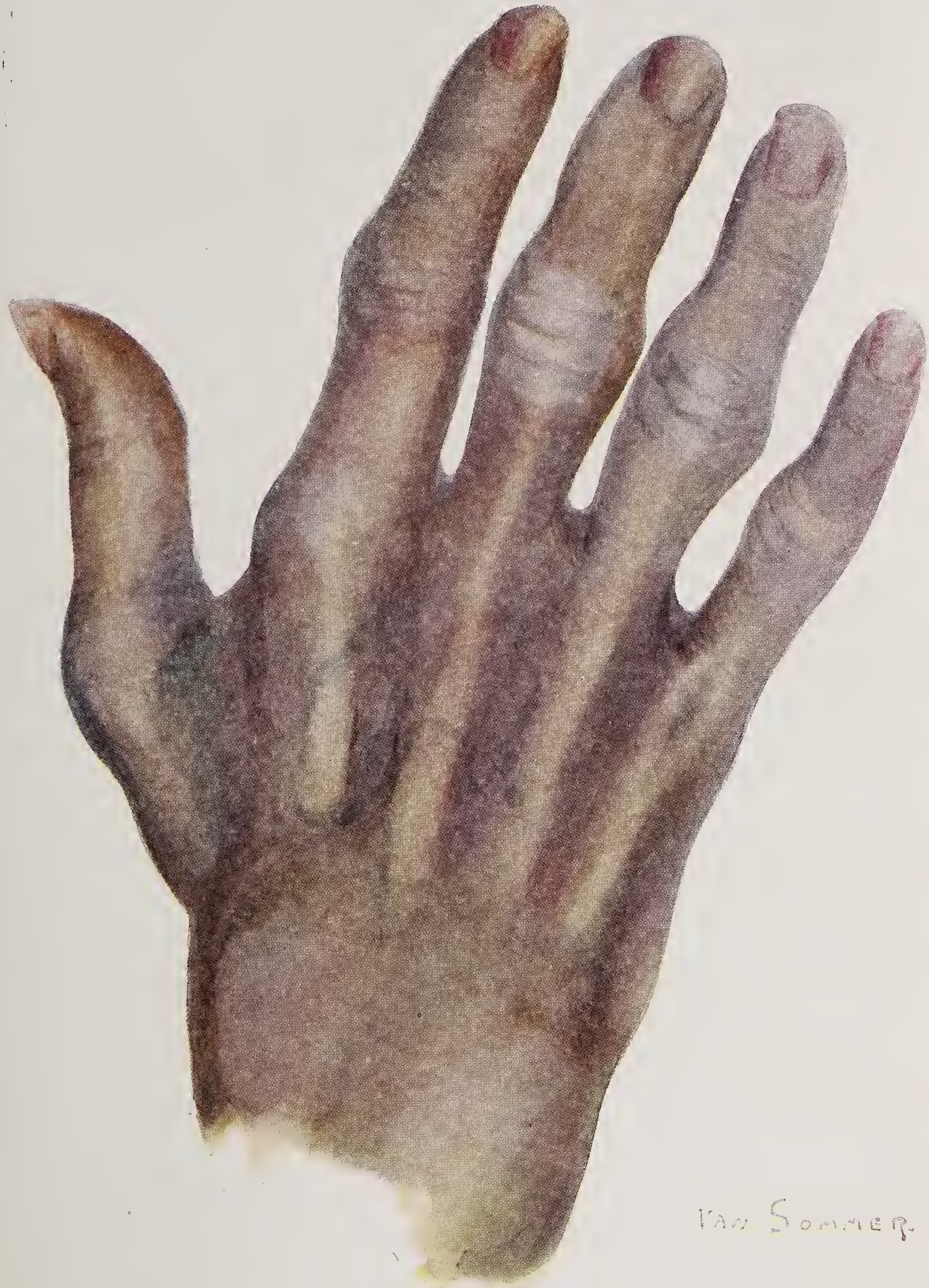


PLATE III.

Rheumatoid or Atrophic Arthritis: Primary Stage.

Note spindle or fusiform enlargement of mid-phalangeal joints, wasting of interossei, also bluish or cyanotic tint of skin over affected joints.

To face page 134.



VAN SOMMER.

Plate III.

and necessarily calls often for most elaborate investigation of the motor and secretory functions of the bowel, and a searching examination of both urine and fæces.

The fullest advantage should be taken of all modern aids, such as X-ray examination after barium or bismuth meals, so as to ascertain the presence of any displacement of the bowel, or any condition of stasis with delay in the passage of its contents.

In obscure cases the *fæces* have to be scrutinized for evidences of pancreatic inefficiency, such as bulky pale stools, undigested meat fibres, and excess of neutral fat. In addition their bacterial content, if abnormally high, may have to be noted, as the results of vaccines prepared from the predominant organism have been followed by such amelioration as to suggest a causal connection.

The *urine* should be carefully analyzed for the presence of hyper- or hypo-acidity, also for excess of aromatic sulphates and indican, as evidences, though ill-established, of intestinal putrefaction.

Equally important, too, is it that a bacteriological investigation should, if necessary, be undertaken, for there is increasing evidence that an etiological significance may attach to coliform bacilli, streptococci, and other organisms.*

In conclusion, it will be obvious that we are faced with a task of no common difficulty when we attempt to establish an exact *etiological* diagnosis of any individual case of chronic rheumatism, whether of arthritic, muscular, or neuralgic type.

In effect, as we have seen, all efforts at specific diagnosis in the majority of instances are unavailing, and in reality we have to postpone our causal diagnosis pending the results of treatment directed to correction of that departure from physiological integrity which we may provisionally deem the *fons et origo mali*.

We shall now pass on to consider the diagnosis and differential diagnosis of the different varieties of chronic articular rheumatism.

Diagnosis of Articular Fibrositis or Chronic Articular Rheumatism.

The fatal facility with which the term "rheumatic" can be applied to an ailing joint is responsible for many diagnostic downfalls, for but too frequently is it assumed that, this mere nosological feat once accomplished, there is no call for further or nicer discrimination.

---

* The further step of differentiating and determining the exact organism, which may be responsible for the arthritic, muscular, or neuralgic phenomena in any given case, will be dealt with in the paragraphs devoted to the consideration of serum and vaccine therapy. (*Vide* chapter on General Treatment.)

Albeit, but little reflection suffices to show that this simple dubbing of a joint as "rheumatic" is almost meaningless, and, to be candid, it would be more rational to admit to ourselves that there is nothing pathognomonic about the anatomical lesions produced, and that they cannot be referred to any one specific cause, but to a variety of agencies.

Divesting ourselves in this way of all preconceived ideas, and embarking on our diagnostic quest in this more catholic frame of mind, we shall, we feel assured, be more certain of arriving at sound conclusions as to the etiology and nature of any given case.

Arthralgic Type.

Fleeting Arthralgia of Erratic or Nomadic Incidence.

Vagrant pains which flit from joint to joint are always suggestive of an infective or toxic blood-state, but to assume forthwith that such are necessarily *rheumatic* in nature is distinctly unwise. While, of course, such nomadic pains are frequent features of a diffuse fibrositis, it is well to reflect that they are sometimes referable to some definite infective agent—*gonococcal, syphilitic, or tuberculous in nature.*

While the fleeting arthralgias of gonorrhœa and syphilis are well recognized, it is doubtful if those associated with tubercle have attracted the attention their significance demands.

Not only do arthralgias, but also myalgias, occur in these subjects, presumably as the result of the tubercle bacillus or its toxin.

The pains, rambling in incidence, are never of high grade, and especially affect the larger joints. Their prime importance lies in the fact that they may antedate the appearance of detectable tuberculous lesions elsewhere in the body. Their subsidence, too, it may be remarked, is often signalized by the frank efflorescence of some hitherto latent visceral form of tuberculosis. To be alive to this possible cause of arthralgia would go far to insure its timely recognition, and in suspicious cases, where the personal or family history discloses evidences of such a taint, no time should be lost in clinching the diagnosis by means of the serum reaction.

Fixed Arthralgia (*Monarticular*).

As we pointed out in our clinical account of the arthralgic types, the pain, after wandering from joint to joint, may settle in *one* articulation, and such cases not infrequently prove a source of diagnostic confusion. For, obviously, a mere neuralgia affecting

PLATE IV.

RHEUMATOID OR ATROPHIC ARTHRITIS: TERMINAL STAGE.

The primary fusiform enlargement of mid-phalangeal joints has undergone shrinkage. Note atrophied and glossy skin and disappearance of normal folds over mid-phalangeal joints.

To face page 136.

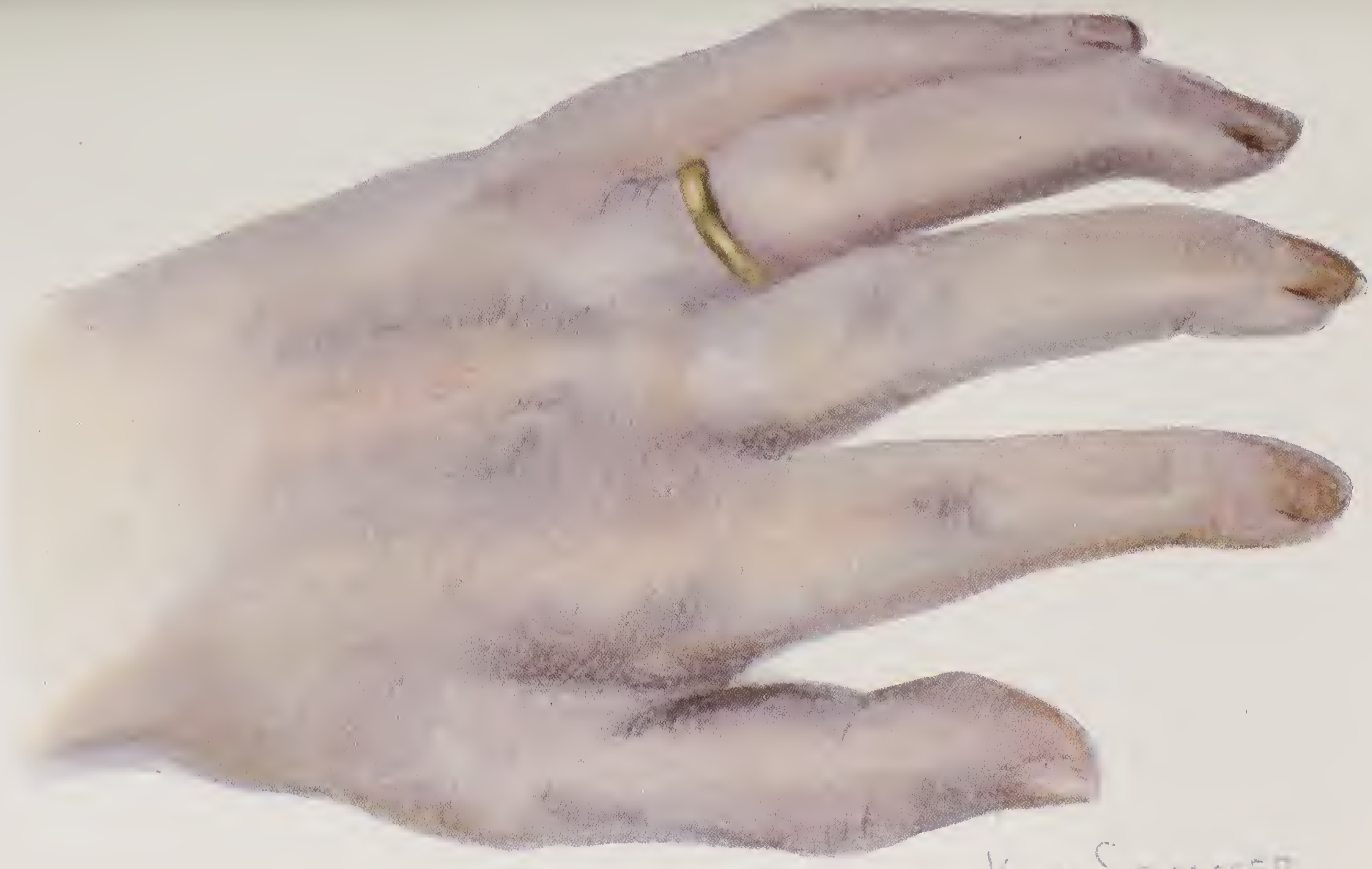


Plate IV.

a single joint, and accompanied by minimal, if any, objective change, may be symptomatic of many and diverse conditions—hence the paramount necessity of careful discrimination before labelling any given instance as "rheumatic" in kind.

Thus, in the case of the knee, it may be of the nature of a *referred pain due to hip disorder*—tuberculous or osteo-arthritic in character.

The possibility, too, that it may be symptomatic of an *inflammatory change or a neoplasm in the bones* entering into the articulation must not be overlooked. For all will readily admit the frequency with which deep-seated tuberculous or pyogenic foci near the articular ends may be confounded with "rheumatism"—at any rate in their early stages.

We have ourselves seen, not only tuberculous osteitis, but acute traumatic epiphysitis, and also acute necrosis, erroneously dismissed as "rheumatic," and with very serious consequences.

It may be safely said that in youth and adolescence monarticular pain should not suggest "rheumatism," but an infective disorder in the extremities of the long bones.

We would emphasize, also, the facility with which the pain associated with myeloid and periosteal sarcomata may be misconstrued as "rheumatic," instances, indeed, of such misapprehension having come under our own observation.

As further illustrating the need for caution, the following rare contingent cause of joint pain is perhaps worthy of note:

Briefly put, the subject, a middle-aged man, was referred to one of us in regard of an arthralgia affecting his right knee, and deemed "rheumatic" in character. On examination the joint, beyond an almost inappreciable degree of puffiness, displayed no objective changes, while its mobility was unrestricted. The popliteal space was, fortunately, not overlooked during the examination, and its inspection revealed a pulsatile swelling, which proved to be a *popliteal aneurysm*.

Again, it is well to remember that obstinate pain of this character in the shoulder or knee may be an early symptom of *syphilitic* infection, and, indeed, may antedate the appearance of secondary phenomena.

From the foregoing it will be seen that there are numerous pitfalls which beset the diagnosis of "rheumatic" arthralgia, and, even after excluding these graver sources of error, we have yet before us the difficult task of eliminating those joint affections of purely neurotic character.

The diagnosis of such *joint neuroses* is often a perplexing problem, but attention to the following points should prove helpful:

The subjects are generally, though not invariably, females, who either display hysterical manifestations or give a history of such antecedents.

The joints most commonly affected are the knee and hip, and real disease may be closely simulated.

The salient feature is the severity of the subjective symptom—pain—and the marked degree of functional impairment as contrasted with the minimal character of the objective changes. The pain is indefinite, not so localized or limited as in true arthritic disorder, and is markedly under the influence of mental states. Superficial tenderness is exquisite, deep pressure being more easily borne. The stiffness or rigidity, which may be absolute or partial, disappears under anæsthesia.

As Sir William Bennett remarks, *painful stiffness of a joint of any duration, if correlated with an absence of heat, swelling, and local muscular wasting*, is very suggestive of a joint neurosis.

In conclusion, before dismissing any case of joint disorder as purely neurotic, one should, of course, be careful to exclude grave cord lesions, such as *tabes dorsalis*, inasmuch as obstinate arthralgia of the knee or shoulder is sometimes one of its earliest symptoms.

We make no apology for dealing at this length with monarticular neuralgia, inasmuch as an extensive experience has convinced us that the diagnosis of "rheumatic" arthralgia is often rashly undertaken, and, in truth, is responsible for not a few of the graver diagnostic catastrophes that occur in this sphere.

Osteo-Periosteal Neuralgia.

In diagnosing this affection care must be taken to ascertain the exact *site* of the pain, so as to avoid confusion with those of arthralgic type. When the attacks have been of long duration, it is essential that any objective changes in the shape of *periosteal swellings* should not be overlooked.

In the matter of differential diagnosis, we should be mindful that such pains may usher in the onset of specific infectious disorders, but the further course of the malady should suffice to clear up its nature.

In the more chronic cases we should be careful to exclude the osteoscopic pains of *syphilis*, and the vague pains met with in the limbs in neurasthenia.

PLATE V.

Osteo-Arthritis of Hand.

Note Heberden's nodosities on terminal phalanges, and lateral displacement of these to one or other side. First metacarpo-phalangeal joint also the seat of bony enlargement.

To face page 138.

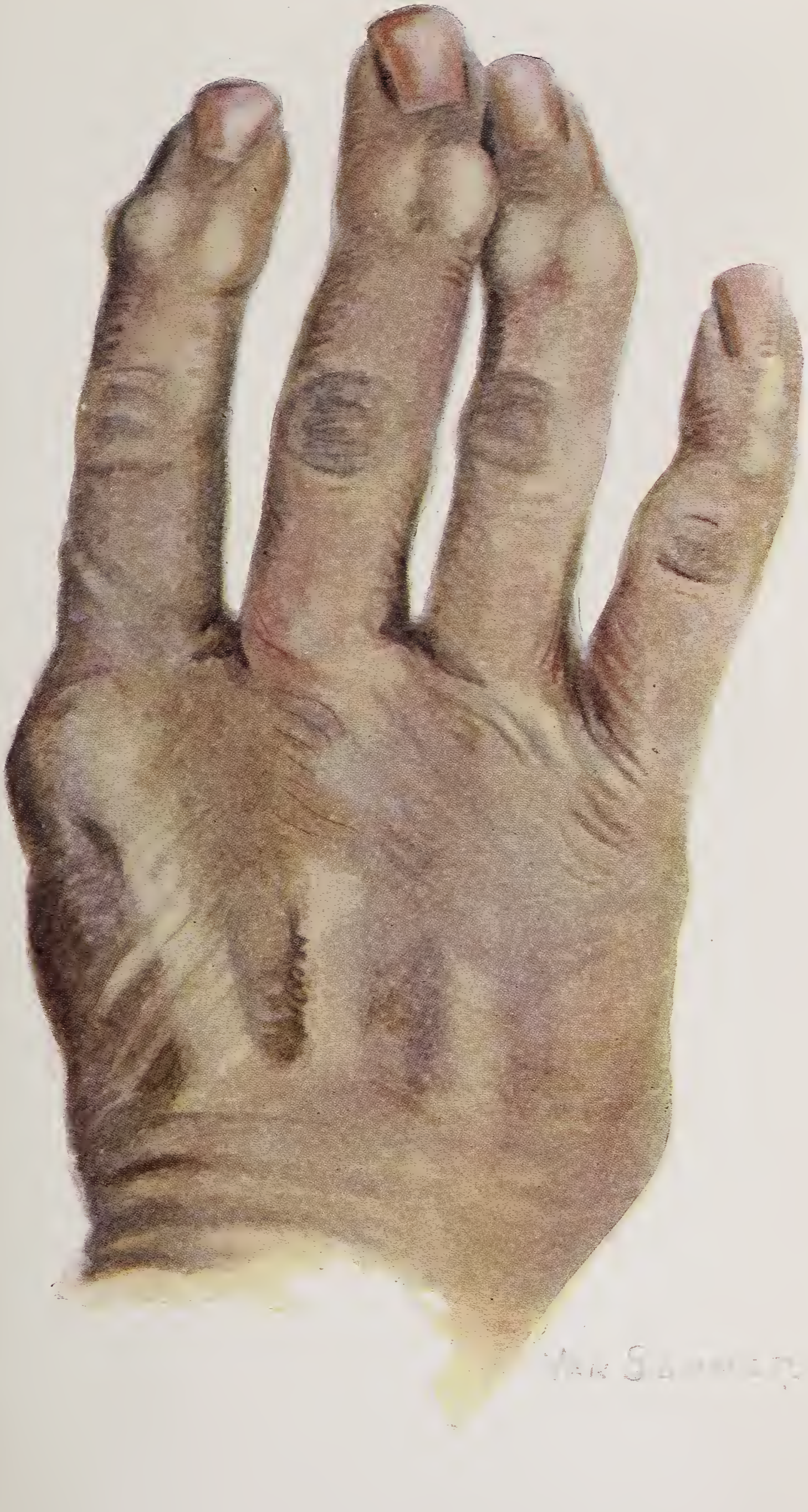


Plate V.

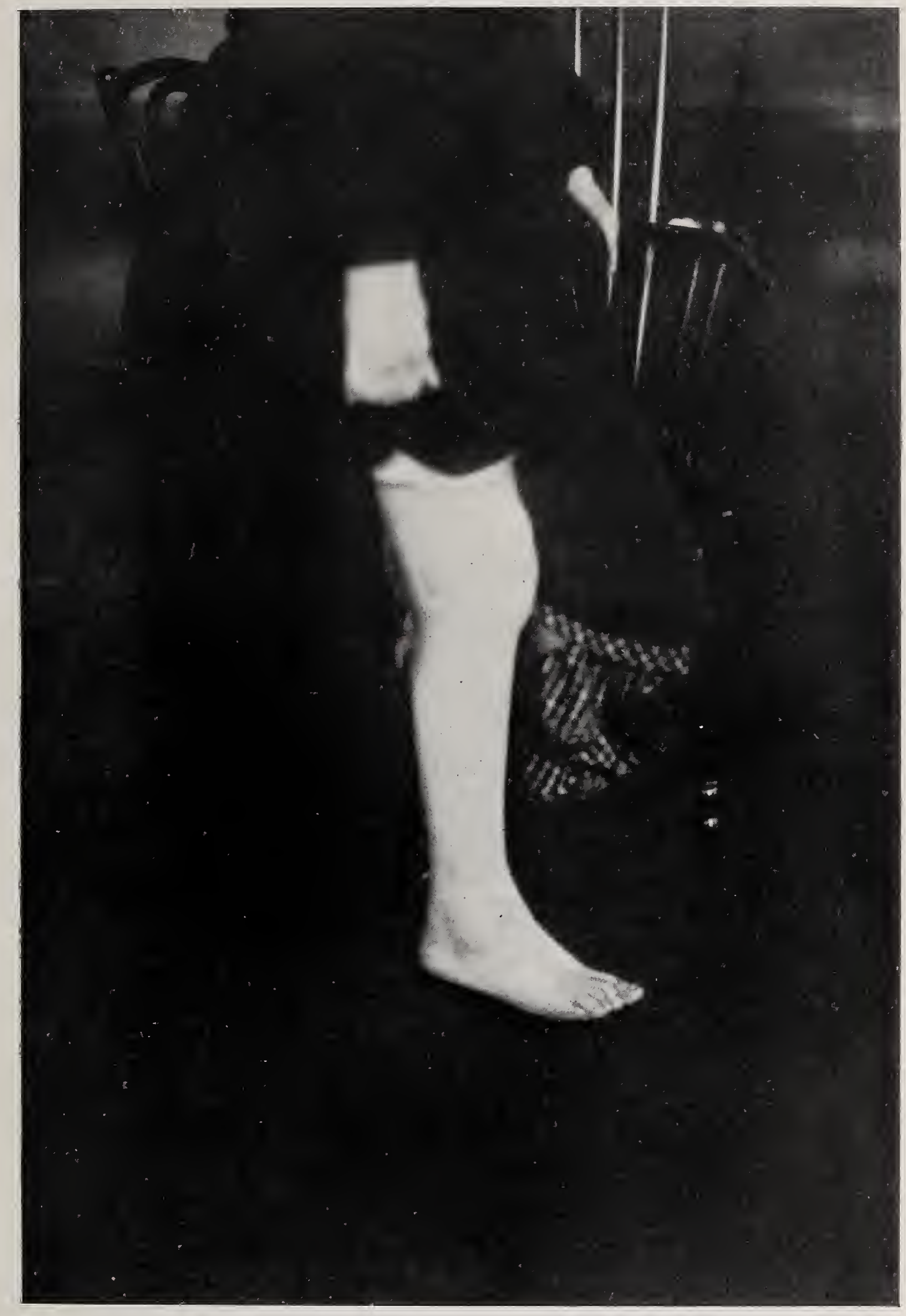


Fig. 20.—Multiple arthropathies of knee and right hand (small joints) in a woman, the subject of syringomyelia.

To face page 138.

Periarthritis, or Infective Arthritis of Undifferentiated Type.

Before proceeding to the differential diagnosis of this group, it would be advantageous, we think, to indicate briefly its salient characteristics.

Etiology.—The disorder is not as a rule primary, but arises secondarily to some infective or toxic focus elsewhere, situated either in the mouth, throat, nose, the lower levels of the alimentary tract, or genito-urinary passages.

Age and Sex Incidence.—No period of life is immune, both sexes being equally liable.

Onset.—This is commonly acute, but it may be subacute and gradual.

General Symptoms.—These, though variable, are often marked —viz., pyrexia of irregular type, glandular and occasionally splenic enlargement, with leucocytosis. No cardiac lesions are found.

Local Symptoms.—Pain occurs in the affected joints on movement, but as a rule it is absent when the joints are kept at rest. Local tenderness is usually marked.

Mode of Invasion.—For the first few days there is synovial effusion, with marked flitting of pains from joint to joint, and at this stage the disorder in favourable cases clears up.

In unfavourable instances, after six or seven days, the malady recedes from all joints save one, two, three, or at most four, of those primarily involved, and displays no subsequent tendency to invade other joints.

This fixity of the joint lesions, and their mono- or oligoarticular distribution, constitute the salient features of this type of arthritis.

Character of Joint Lesions.—The initial synovial effusion in severe cases is replaced or masked by progressive periarticular infiltration.

Swelling is not circumscribed as in synovial effusion, but vague in outline, often more pronounced to one or other side, and does not fluctuate, but pits on pressure. The joint swelling is often accompanied by œdema of the neighbouring parts.

Course of Disease.—This varies with the intensity of the infective or autotoxic state. The attack is sometimes mild and of brief duration, and followed by complete restoration of the joint's efficiency. In severe cases pyrexia may continue for weeks and months, with wasting and secondary anæmia.

Sequelæ.—In less severe types impairment of functional efficiency, either from synovial adhesions, capsular thickening, or villous overgrowths, is met with. More commonly there is limitation of movement and malposition due to progressive shrinkage of the periarticular, capsular, and ligamentary structures, with contracture of the related flexor tendons.

Therapeutic Test.—The action of salicylates is uncertain, and in no way specific.

Differential Diagnosis.

In pursuance of this, it will be necessary to eliminate (1) acute articular rheumatism; (2) acute rheumatoid arthritis; (3) those forms of arthritis referable to some specific infection; (4) other types of joint disorder.

1. Acute Articular Rheumatism.

Etiology.—Young adults are most frequently affected, and after twenty years of age males predominate.

Onset.—This is abrupt, and often preceded by tonsillitis.

General Symptoms.—Severe pyrexia, loss of appetite, profuse sweats, acid urine, and constipation are present.

Distribution of Lesions.—It is polyarticular, with a predilection for the knees, elbows, ankles, and wrists. There is a marked tendency to flit from joint to joint, leaving *no residual thickening.* The joint swellings are largely due to synovial effusion, but may be accompanied by periarticular infiltration. The affected joints are exquisitely painful and sensitive. No wasting or contracture of the related muscles is found.

Associated Phenomena.—Cardiac lesions are very common.

Therapeutic Test.—Salicylates exert a specific action.

2. Acute Rheumatoid Arthritis.

Etiology.—The affection is most common in young women.

Onset.—This is more or less acute.

General Symptoms.—Continuous pyrexia of low grade, quick pulse, and rapid emaciation are present, and associated commonly with gastro-intestinal derangements.

Distribution of Lesions.—It is polyarticular. Beginning in the small joints, it spreads centripetally with a tendency to symmetry. No flitting from joint to joint occurs, but steady progressive involvement, not only of the peripheral joints, but also of the temporo-maxillary and cervical articulations, ensues.

The skin over the joints is waxy white or semi-asphyxial in tint. The contour of the swelling is smooth and spindle-shaped, but in the terminal stages shrinkage from atrophy of the articular struc-

PLATE VI.

Gouty Arthritis.

Note large tuberous swellings on knuckle and metacarpo-phalangeal joints due to uratic deposits.

To face page 140.

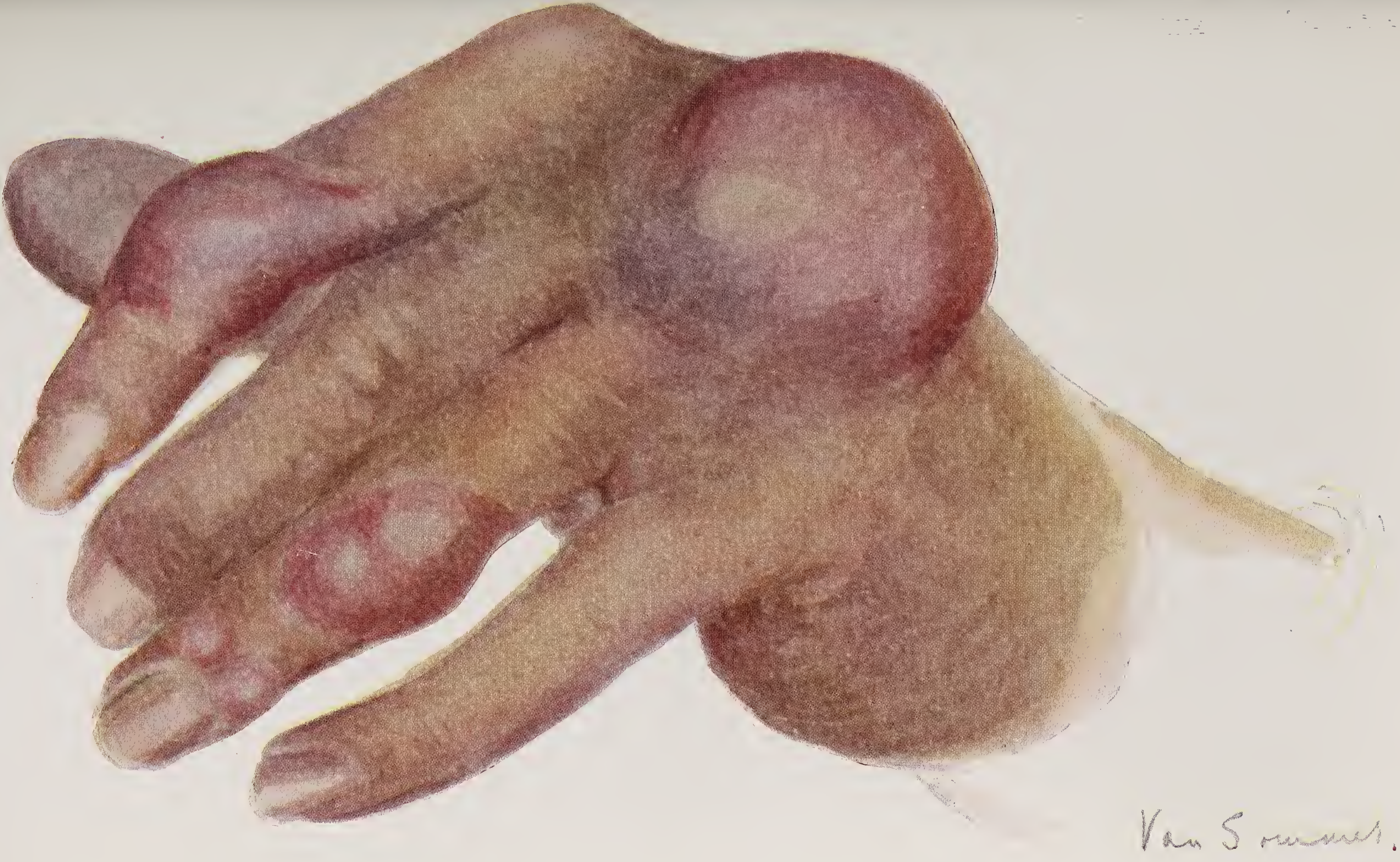


Plate VI.

tures sets in. Muscular spasm and wasting with contracture are prominent features.

Associated Phenomena. — There is an *absence of cardiac lesions*, but trophic disturbances, pigmentation, vasomotor phenomena, and glossy skin are very typical of this affection.

Therapeutic Test.—The action of salicylates is not specific.

3. Forms of Arthritis referable to Some Specific Infection.

(*a*) *Gonorrhœal Arthritis.*

Etiology.—There is a history of or presence of urethral or vaginal discharge, supplemented by detection of the gonococcus.

Onset.—This is insidious, seldom acute.

General Symptoms.—These are absent or slight as compared with severity of joint mischief.

Distribution of Lesions.—This is commonly monarticular, and usually the knee is involved. The joint affection may take the form of persistent passive effusion, or of a periarticular boggy swelling, with redness and local heat.

Associated Phenomena.—Involvement of *fasciæ*, especially plantar, and of tendon sheaths, is very distinctive, while coincident *iritis* or conjunctivitis is almost diagnostic.

(*b*) *Secondary Syphilitic Arthritis.*

The frequency with which this affection is falsely dubbed "chronic rheumatism" calls for remark.

An arthritis of this character is usually subacute in degree, and the following case will illustrate the ease with which confusion may occur:

Some years ago one of us was consulted by a middle-aged man, invalided from Africa, under a diagnosis of tuberculosis of left apex, and "rheumatism" of the right knee and ankle joints.

His temperature for weeks had been constantly raised at night. On investigation, no physical signs of pulmonary tuberculosis were observed, and, notwithstanding repeated examination of the sputum, bacilli had never been detected. The joints referred to were swollen, and a periosteal swelling along the tibial crest, and very sensitive to pressure, was noted. In addition, some secondary syphilides were remarked on the trunk, and on the face a well-marked corona Veneris.

Accordingly a diagnosis of secondary syphilis, with the customary intermittent fever, was arrived at. Under specific treatment his temperature fell to normal, the joint and skin changes disappeared, and a year afterwards he was in good health.

In a somewhat similar case the roseolous eruption and joint swellings were ascribed to gout.

Confusion of specific with so-called " rheumatic " arthritis is especially likely to occur if syphilitic infection with secondary joint swellings should supervene in a person already the subject of valvular disease. Such a case came recently under our notice, in which, fortunately, the development of a node led to timely recognition of its true nature.

(c) *Chronic Tuberculous Rheumatism.*

We have in our etiology indicated with what frequency a positive reaction to tuberculin is forthcoming in some cases of chronic articular rheumatism.

As Poncet has shown, apart from the familiar white swelling, we have to reckon with those aberrant types which closely simulate so called chronic rheumatic arthritis. According to this observer, we may get a similar plastic inflammatory change in the periarticular tissues, as well as the related bursæ and tendon sheaths.

The diagnosis will rest on the *detection of visceral foci, usually of fibroid type, the sero-reaction*, and the *future course of the affection.*

In conclusion, the foregoing are the types of specific arthritis which are most commonly confused with so-called " chronic articular rheumatism "; but as showing that they do not exhaust the possibilities of confusion, we have under our care an instance of *pneumococcal* arthritis which was erroneously classed as " rheumatic." The subject, a middle-aged man, while recovering from pneumonia, developed arthritis in both knees, which, though it took a favourable course, did not entirely clear up. His persistent stiffness, for which he sought spa treatment, was, in short, a relic of his acute arthritis, which had led to thickening of the synovial membrane, with detached masses of fibrin acting more or less efficiently as loose bodies.

Lastly, the *post-exanthematous types of arthritis* should not lead to confusion, if the history of the case be taken into consideration.

4. **Non-Infective Types of Arthritis.**

But little remains to be said on these, and we shall only draw attention to hæmophilic arthritis and the nerve arthropathies; for while both of these, with reasonable care, should be identified, yet in our experience *Charcot's disease* of the knee is not uncommonly confused with " rheumatism," and we have also known a *syringomyelic* arthropathy lead to a similar misconception.

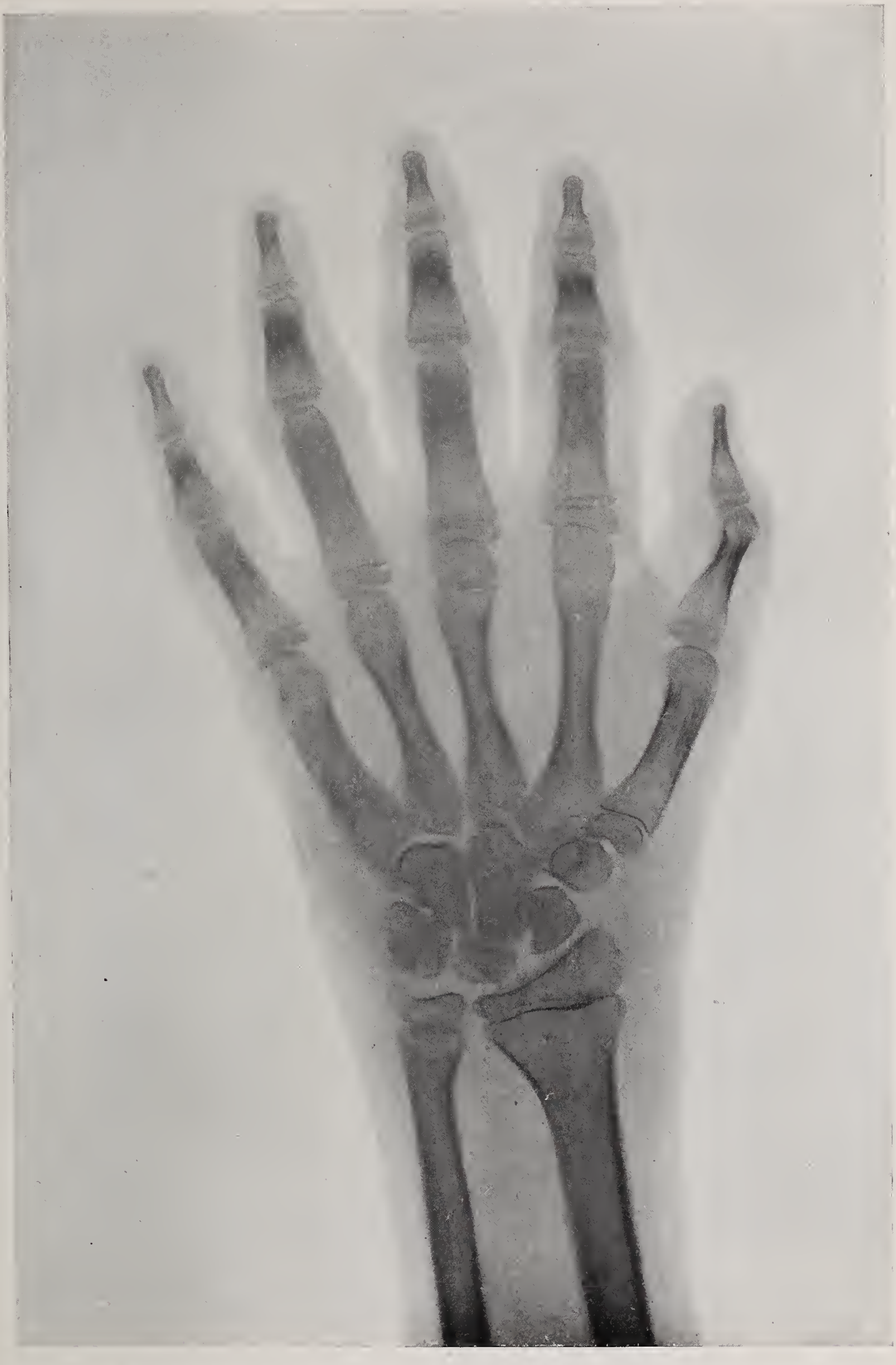


FIG. 21.—Infective arthritis in child eleven years old. Transparency of ends of bones and no bony enlargement.

To face page 142.

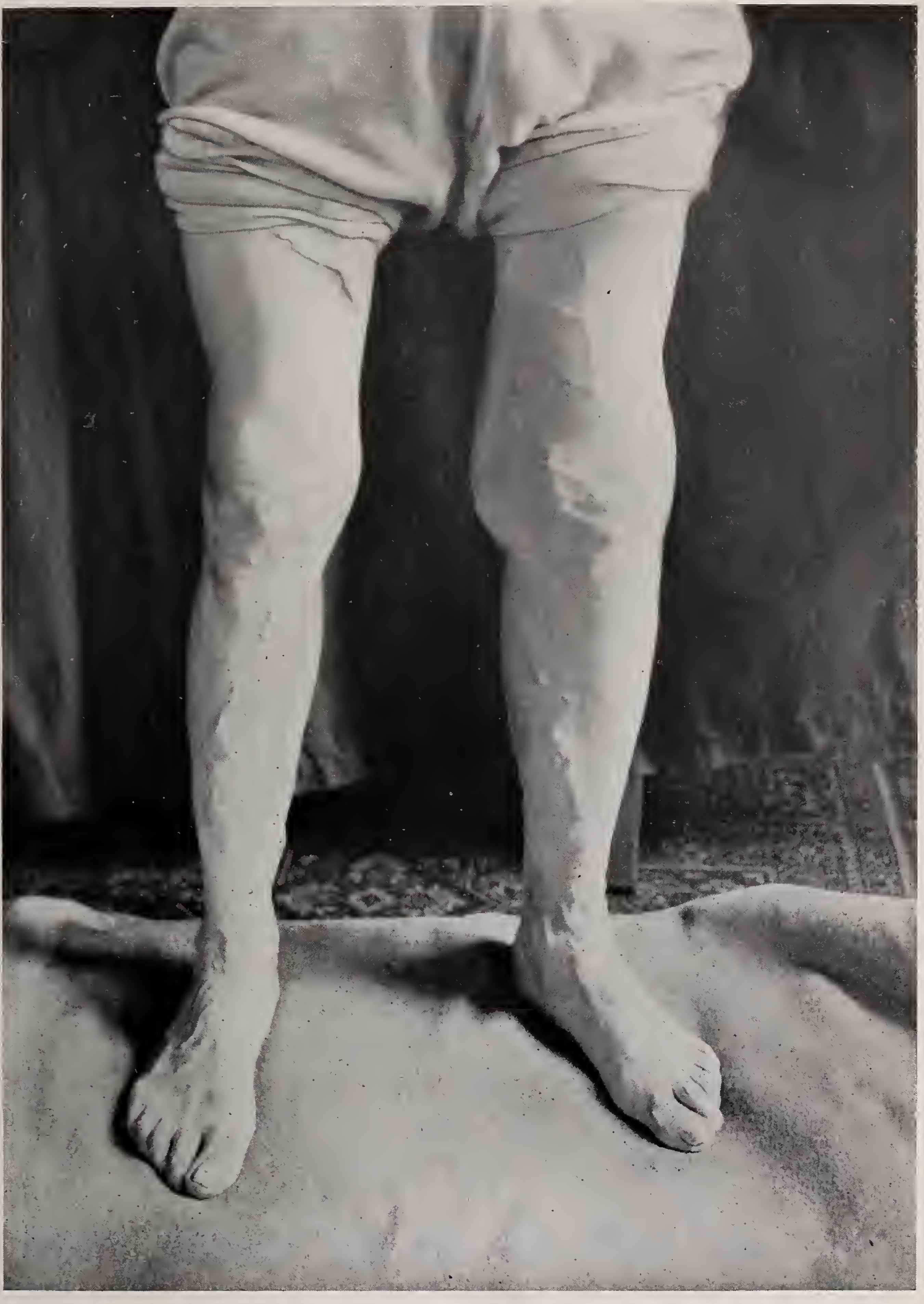


FIG. 22.—Tabes dorsalis, with arthropathy of left knee.

To face page 142.

Hæmophilic Arthritis.

Etiology.—Men or boys are most liable. A history of previous hæmorrhages, epistaxis, etc., is usual. Its occurrence may follow injury, but more often it is spontaneous in origin.

Symptoms.—It may be polyarticular in distribution, but commonly affects the knee. Sudden enlargement of joint ensues, with often tenderness and pain on movement, and distinct fluctuation. The swelling may subside, but there is a tendency for it to recur with secondary organic changes.

In the matter of diagnosis the *personal and family tendency to hæmorrhages* is the most important clue.

Nerve Arthropathies.

The following are the salient features of these affections: Sudden, spontaneous, and often massive effusion; *complete absence of pain;* mobility unimpaired, often of abnormal extent; subcutaneous œdema, crepitus, and deformity from bony outgrowths; general symptoms of central nerve disease.

Chronic Fibrous Rheumatism.

Localized Varieties.

In regard of the *articular types*, a careful scrutiny and physical examination of the affected joints is, of course, necessary, and this, together with the results of radiography, should suffice to indicate the periarticular site of the morbid changes, and the non-implication of the bony and cartilaginous structures.

The further differentiation of these types in accordance with the French classification will, of course, be decided by the exact nature and site of the articular lesions, and the presence of signs pointing to gastro-intestinal disturbances, arterio-sclerotic changes, or evidences of chronic infection of the biliary passages.

In regard of the *fascial* type, we have to distinguish it from contraction of the fingers resulting from prolonged use of splints, or as a sequel to septic tenosynovitis, and, lastly, from the distortions resulting from certain paralyses. Attention to the previous history should exclude the first two sources of fallacy, but in regard of the various paralyses the following points should prove helpful:

In *progressive muscular atrophy* there is wasting of the thenar and hypothenar eminences, together with general flattening of the hand, while the thumb is drawn backwards and outwards.

In *cervical hypertrophic meningitis* the deformity assumes the following appearance: hyperextension of wrist, with extension of the metacarpo-phalangeal and flexion of the phalangeal joints—the preacher's hand.

The contractures resulting from ulnar, median, and radial paralyses should be borne in mind and excluded, and also *sclerodactyly*, though as regards this latter the violaceous tint of the hand and the pronounced trophic changes, with often ulceration of the soft parts, should suffice to distinguish it.

Generalized Varieties.

In regard of the *benign* form, the points to rely on are its essential chronicity, its predilection for the large joints, its tardy involvement of the joints of the hands and feet, and the periarticular value of the morbid changes as disclosed by radiography.

Further, it contrasts with the malign form in that a history of acute articular rheumatism is seldom forthcoming, and any cardiac lesions that may be present are usually of a degenerative kind.

The diagnosis of the *malign* type, or *le rhumatisme chronique fibreux*, will vary according to the period at which one is first confronted with this deplorable affection.

In its earliest stages it may be confused with subacute articular rheumatism and later with gonorrhœal arthritis and other joint diseases.

In any given case the following features will be suggestive of oncoming chronic fibrous rheumatism:

A previous history of one or more attacks of acute rheumatism, with a disposition to special involvement of the *smaller joints of hands and feet*, is often forthcoming. Of special significance would be coincident gradual *implication of the palmar and plantar fasciæ*, with a tendency to malposition of the fingers and toes through retraction of newly-formed fibrous bands. Evidence pointing in the same direction would be any participation of the related tendon sheaths or bursæ in the morbid process.

Absence of any proneness to vagrancy on the part of the joint lesions is very typical, also *persistent and progressive periarticular thickening*. Further confirmation would be furnished if persistent stiffness be found affecting the muscles, especially those remote from the diseased articulations, with nodular or diffuse infiltration of their sheaths or aponeuroses.

The chief sources of fallacy in *differential diagnosis* occur in connection with the following disorders:

Subacute Articular Rheumatism.—In this case the greater severity of the constitutional symptoms—viz., pyrexia, profuse sweating, white furred tongue—would be significant. In addi-

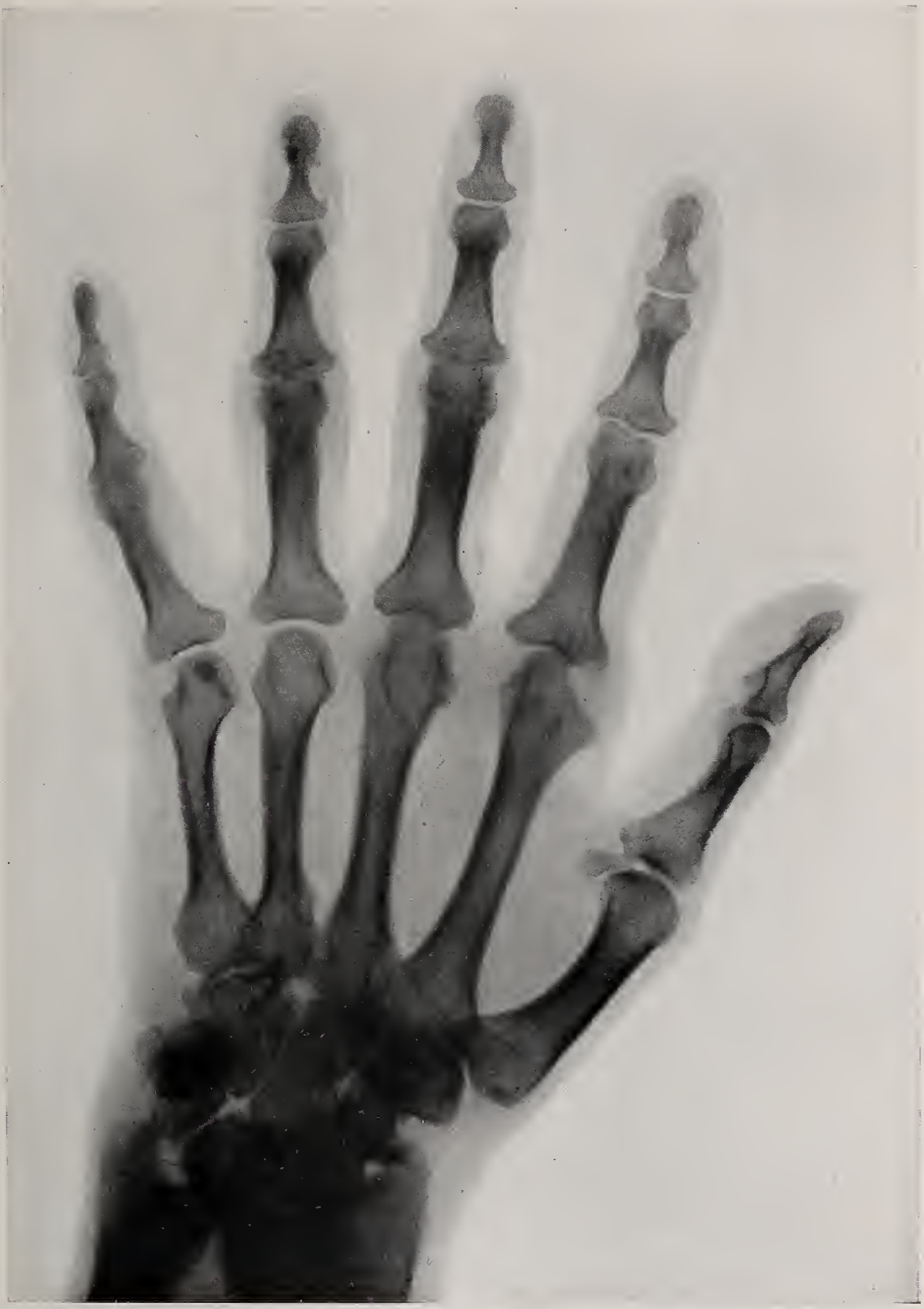


FIG. 23.—Rheumatoid or atrophic arthritis. Atrophy of cartilage of metacarpophalangeal joints of index and middle fingers. Destruction of bony tissue in heads of metacarpal bones. Also shows atrophy of cartilage in mid-phalangeal joint of little, ring, and middle fingers.

To face page 144.

tion, the tendency is to implicate the larger, and not the smaller, articulations, with a disposition to wander from joint to joint.

There is no proclivity to involvement of fasciæ, tendon sheaths, or bursæ, unless occurring in association with or following scarlet fever.

The presence of cardiac lesions is of no value in differentiation, inasmuch as some cases of acute articular rheumatism are followed by such subacute attacks, which gradually develop into chronic fibrous rheumatism.

Gonorrhœal Polyarthritis.—It cannot be too strongly insisted that this condition may closely mimic every aspect of chronic fibrous rheumatism, not only in respect of the periarthritic changes, but also in that the fascial, bursal, and tendinous structures may be simultaneously and severely implicated.

Especially mindful should we be that a dry polyarthritis of this nature sometimes involves the joints and tendon sheaths of the wrist and hand, and that the resultant malposition and crippling is such that, in the absence of proof of infection, the condition is clinically indistinguishable from that typical of chronic fibrous rheumatism.

The following points would be especially significant of a gonorrhœal origin: *Involvement of the temporo-maxillary, sterno-clavicular, sacro-iliac, or spinal articulations, the occurrence of iritis, or the detection of synechiæ.* The presence of cardiac lesions is no distinction, as they may complicate gonorrhœa.

Finally, in doubtful cases the complement deviation test for gonorrhœa, if positive, would serve to ratify the diagnosis.

Chronic Rheumatoid or Atrophic Arthritis.—This disorder in its *early* phases, viz., before atrophic condensation of the spindle-shaped articular swellings has ensued, can hardly be confused with the changes that take place in the hands in chronic fibrous rheumatism.

In its *later* stages muscular spasm and wasting are prominent, and contractures common, but the deformities are due to definite muscular retraction, and not to the shrinkage of newly-formed fibrous bands, as in chronic fibrous rheumatism.

Again, in atrophic arthritis there is no special implication of tendon sheaths, palmar or plantar fasciæ, while in its terminal stages, when secondary atrophy of the cartilaginous and bony structures ensues, skiagraphy should enable us to differentiate the condition from chronic fibrous rheumatism, in which these changes do not occur.

Generalized Osteo-arthritis.—The more insidious forms of chronic fibrous rheumatism that arise after middle age may be confused with this affection.

The local characters of the articular swellings should suffice to differentiate the two conditions.

Unlike chronic fibrous rheumatism, the enlargement, if present, is due to synovial effusion or to bony outgrowths, and not to periarticular thickening.

In osteo-arthritis the contour of the joint is abrupt and nodular, which is not the case in chronic fibrous rheumatism.

In osteo-arthritis displacement of the bones, if present, is lateral in direction, whereas luxation and hyperextension are typical of chronic fibrous rheumatism.

In other words, deformity of joints is distinctive of osteo-arthritis, distortion of joints of chronic fibrous rheumatism.

Lastly, skiagraphy in chronic fibrous rheumatism reveals none of the bony outgrowths typical of osteo-arthritis.

Chronic Polyarticular Gout.—Gout, usually a disease of paroxysmal character in regard of its articular manifestations, nevertheless does under certain circumstances lead to deformity and thickening, attended with pain, stiffness, and low inflammatory changes of widespread distribution.

The age, personal habits, and previous history of an attack limited to the great toe, coupled with the presence of tophi, the results of uric acid estimation, and the revelations of skiagraphy, will hardly fail to indicate the correct diagnosis.

In drawing to a close this section on differential diagnosis, it may perhaps be thought that we have exaggerated the possibilities of error in this sphere of chronic articular rheumatism; but, in extenuation of the detailed manner in which we have approached this aspect of the subject, we can state definitely that for every source of diagnostic confusion alluded to we could, if space permitted, furnish concrete illustrations.

In truth, the limitations of our knowledge regarding the exact etiology of chronic articular rheumatism place specific diagnosis of the condition in many instances beyond our power.

For, to be honest, there is nothing pathognomonic in the anatomical lesions produced, and which, as a matter of fact, we know to be capable of production by many different agencies.

It so happens, therefore, that any attempt at direct diagnosis is impossible, and of necessity resolves itself into one of sifting or excluding one by one the various known factors by which the anatomical lesions can be initiated.

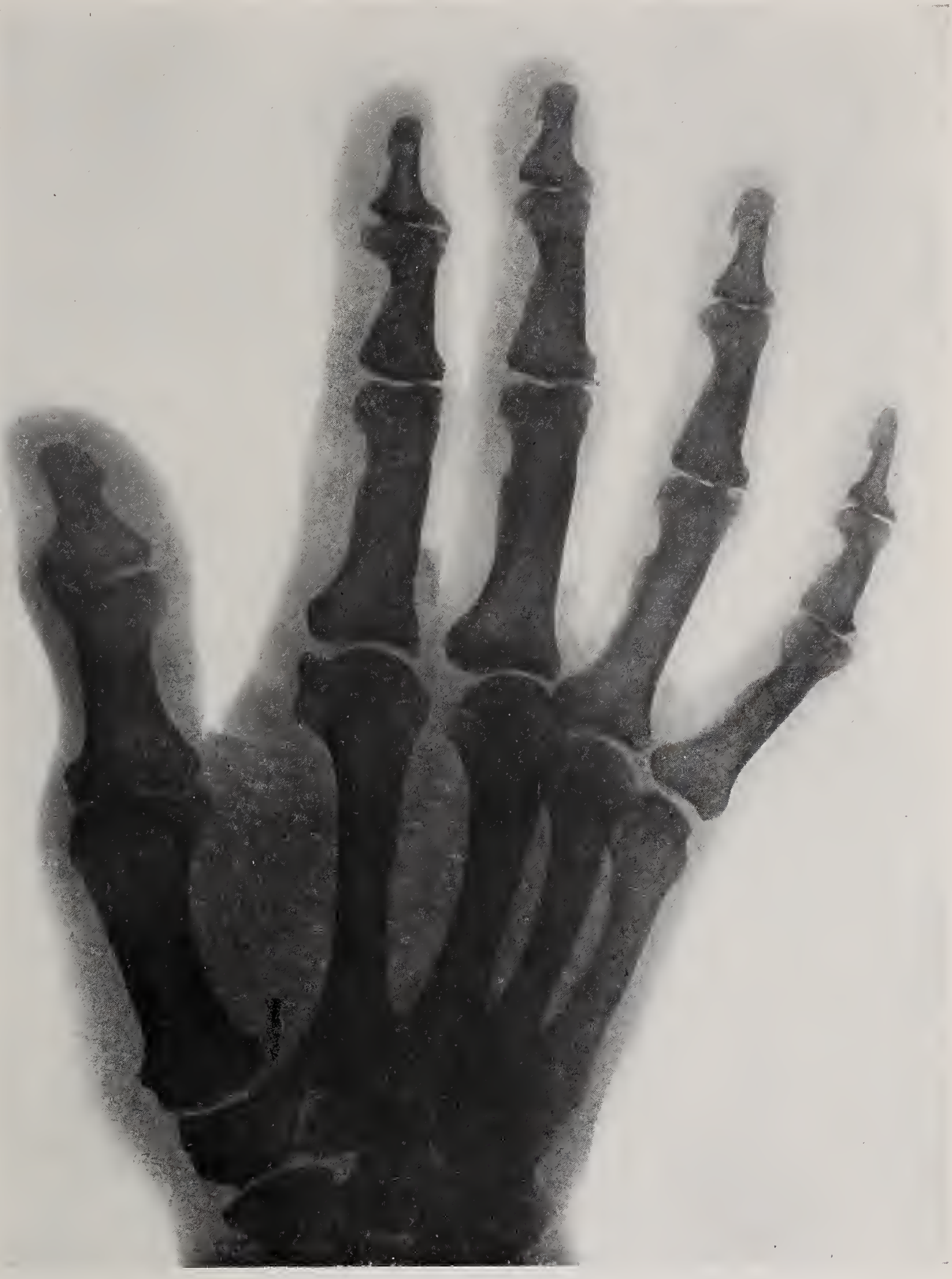


Fig. 24.—Hand showing osteo-arthritic changes. Note the cauliflower appearance of the heads of terminal phalanges. Also deposits "frilling" at bases of all phalanges, with an occasional separated osteophyte; also some deposits on the middle of the shafts.

Skiagraphy.

Of late years great and increasing importance has been attached to skiagraphy in the differential diagnosis of joint diseases.

One of the first to lay stress upon its value in diagnosis was Goldthwait of Boston, who believes that a satisfactory differentiation can be effected by skiagraphy between these undifferentiated types of infective arthritis and other chronic arthritides.

Broadly speaking, from our own experience we believe that his points of discrimination are in the main satisfactory. In *infective arthritis* no changes can be detected in the cartilage or bone, the former being of normal thickness, while the density of the latter is in no way diminished. Finzi, however, holds that there is in the early stages absorption of the cartilage, especially in gonorrhœal arthritis, and in late stages marked bony changes.

It must be borne in mind, however, that in certain cases of this type new bone may be thrown out in the process of repair, and that, if sole reliance be placed on the radiograph without reference to the clinical history and course of the disease, then, as Goldthwait remarks, these irregular bony outgrowths are apt to be confused with those of osteo-arthritis.

The distinguishing feature is that the new formation of bone in these infective types of arthritis is precisely similar to that met with in septic osteitis or periostitis—viz., the bony outgrowths take place at the exact point of infection, wherever that may be, and not, as in osteo-arthritis, at the margin of the cartilage.

In *rheumatoid or atrophic arthritis* absorption of the cartilage takes place to a variable degree, and, though it is sometimes completely absent, this change may be detected in the very early stages.

The bones participating show abnormal translucency to the rays, this usually, but not necessarily, being confined to that portion of the shaft entering into the joint.

Ultimately the articular ends undergo erosion, sometimes very marked, so much so that the bones telescope into each other, as is seen so often in the case of the phalanges.

In *osteo-arthritis* new bony deposits develop at the margin of the cartilage, and in the later stages the bony shafts become more dense.

In *chronic gout* uratic deposits can be discerned by skiagraphy, giving rise to marked shadows, most usually detectable in the fingers and toes. Considerable disintegration of bone may result, and in some instances the appearances may resemble those supposed to be typical of rheumatoid joints.

In other instances the shafts of the bones may show punched-out areas resembling syphilitic dactylitis.

It must, however, be admitted that the results of modern researches seem to indicate that it is distinctly unwise to rely wholly on skiagraphy in these chronic types of arthritis.

Skiagraphy, though of great and probably increasing value, cannot be taken as the sole criterion of differentiation, but must, we believe, be always regarded as subsidiary to careful observation of the general clinical features of any given case of joint disease, supplemented by a thorough bacteriological investigation.

Chronic Articular Rheumatism.

Prognosis.

Our forecast in individual instances will depend on whether the *original focus of infection or toxic absorption* can be satisfactorily determined.

When, as in the case of oral sepsis, pyorrhœa alveolaris, etc., it is localized, and admits of radical treatment or removal, the outlook is favourable, always provided that such foci are treated effectually during the early stages, when we have seen remarkable recoveries.

It is less optimistic when such local foci are absent, and the condition is referable to some intestinal disorder or stasis.

Such conditions often prove refractory to treatment, or, if favourably influenced, the improvement takes place so tardily that the periarticular exudate has time to organize.

This point cannot be too strongly emphasized—viz., that early and efficient treatment of the primary focus is the only condition on which a favourable prognosis can be based, as, if the morbid process has gone on to organization of the effused products, with resulting capsular and ligamentary thickening, more or less persistent disability is unavoidable.

It need hardly be said, too, that the ultimate amount of functional impairment will depend very largely indeed on how far ordinary surgical precautions have been taken in the acute stage to prevent malposition.

While, as before noted, tardiness of recovery is usually referable to infiltration of the periarticular tissues, it must not be forgotten also that in some cases it is due either to synovial adhesions, thickening of the membrane, or villous overgrowth, and here the ultimate prognosis will depend on how far they can

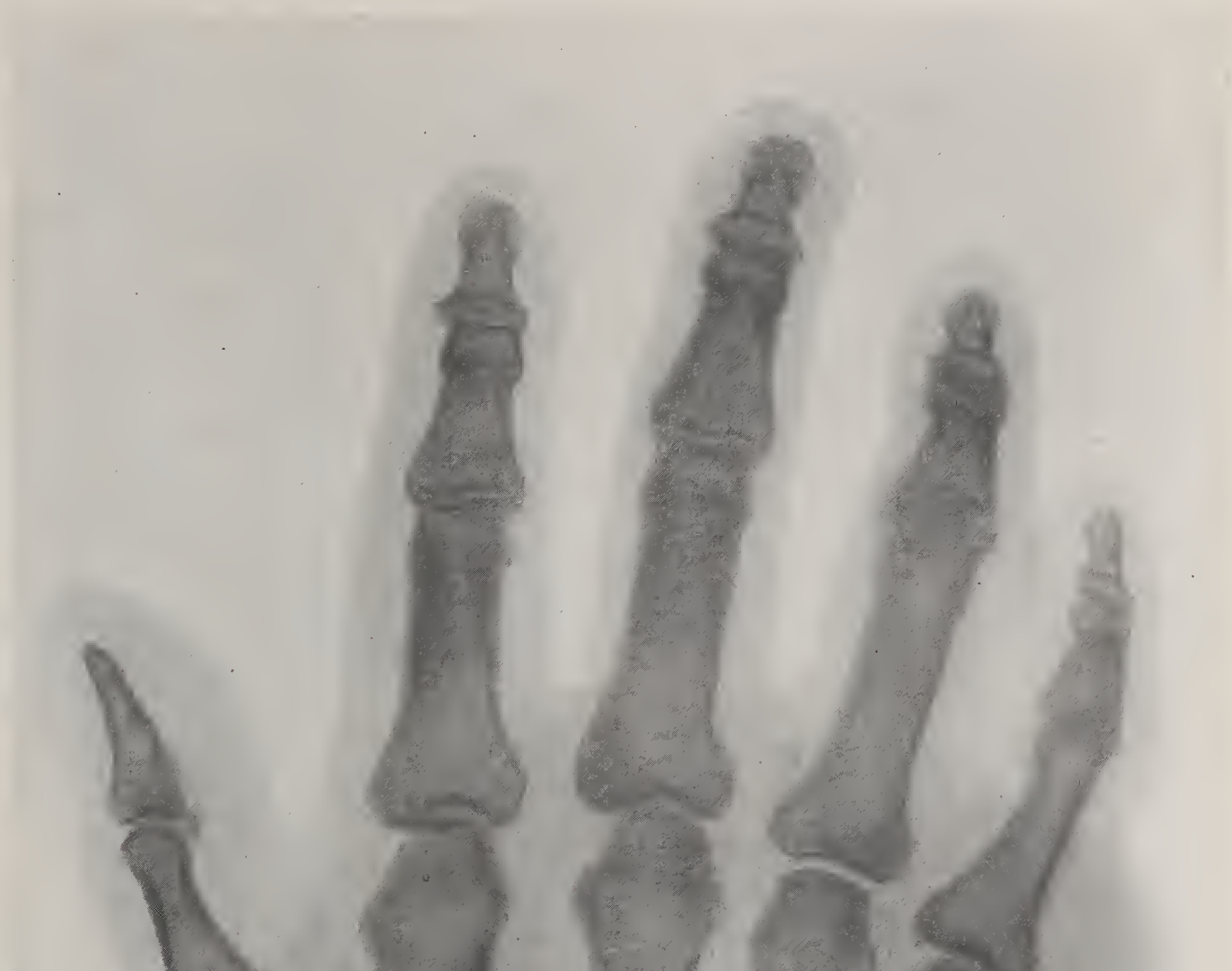


Fig. 25.—Chronic gout, showing large swelling in soft tissues on ulnar side of hand due to uratic deposit.

be influenced by palliative measures or admit of surgical intervention.

In *generalized chronic fibrous rheumatism* the prognosis is favourable as regards life, though it may sadly blight the enjoyment thereof.

It is more gloomy in young subjects, giving a history of recurrent attacks of acute articular rheumatism.

It is brighter in those instances which arise *de novo* in the middle decades of life, and fortunately they contribute the majority. In such the degree of deformity produced is very variable, and in these more benign types the resulting deviations may not be grave enough to interfere with the less highly specialized functions of the hands.

Still, the outlook is always clouded by the obstinate tendency to progress, despite occasional remissions of considerable length.

But in the more malignant types even this respite is denied, the disease marching relentlessly to its fell end, defiant of control and desolate of hope.

INFECTIVE OR TOXIC FIBROSITIS

(B) MYO-FIBROSITIS, OR MUSCULAR RHEUMATISM

CHAPTER VII

(B) MYO-FIBROSITIS, OR MUSCULAR RHEUMATISM

Synonyms: **Myalgia; rheumatic myositis.**

Introductory Remarks.

The extreme diversity of interpretation foisted upon the vague term "muscular rheumatism" necessitates some attempt at definition, for it is but too often regarded as a diagnostic dustbin into which may be thrown all painful muscular affections, which cannot otherwise be conveniently classified.

Doubtless this laxity is in large measure attributable to the act that the anatomical substrata of the affection have until recently, at any rate in this country, received but scanty recognition. But, as the data from human and comparative pathology have shown, there is every reason to suppose that in all but the more transient forms definite anatomical lesions occur.

Adler of New York, whose work in this sphere deserves especial mention, after reviewing the anatomical material either accumulated during life by excision or at autopsy, felt himself justified in making the following definite announcement: "Muscular rheumatism may therefore quite generally be designated pathologically as a myositis interstitialis"—an assertion amply vindicated by the results of modern investigation.

But, nevertheless, we would first clear the ground by excluding from this category all *secondary forms of myositis* due to known etiological factors, also the various types of *dermatomyositis* and *polymyositis hæmorrhagica*.

In this way, also, must be withdrawn the muscular indurations arising as end-products of those *non-suppurative forms of myositis* which sometimes accompany *syphilis*, *tubercle*, *gonorrhœa*, and *actinomycosis*, likewise the intramuscular nodules that characterize *trichinosis*, and which are occasionally to be found in *scleroderma*.

We must not omit also to weed out those *focal connective-tissue hypertrophies* which develop in the wake of *intramuscular injections* of irritating fluids, such as mercury, and, lastly, those in which an overgrowth of the same texture occurs in the process of repair following loss of substance in sequence to *trauma.*

Definition.—But a decade since, few, we imagine, would have been inclined to have gone farther than Lorenz, who, in Nothnagel's Handbook, felt it unwarrantable to aspire to anything more definite than the following hazy description—for it can scarcely be called a definition—of "muscular rheumatism."

He relegated to this category "those diseases in which muscular pain is the prominent symptom, and as a consequence of the pain functional disturbances, and even obstinate contractions, are brought about, but which depend upon no structural lesions, and during life, with the exception of contractions, offer no palpable objective symptoms, and which are due etiologically to cold (Erkaltung)."

Our previous résumé, however, of the cumulative results of anatomical research seems, despite the old saying, "Omnis definitio periculosa est," to justify a corresponding advance on our part towards greater exactness in our definition of this condition.

We would, therefore, suggest that the various types of the disorder may be pathologically defined as examples of *myositis interstitialis* of varying grades of severity and distribution.

In other words, the condition is the outcome of an *acute or chronic inflammatory change in the interstitial fibrous tissues of a striated or voluntary muscle, the parenchymatous elements of which are only implicated secondarily.*

It is well, however, to recognize that no sharp dividing-line can be drawn between the muscular and other varieties of "chronic rheumatism," or fibrositis. For in the vast majority of instances the inflammatory hyperplasia is not strictly limited to the muscles, but encroaches upon other tissues as well, the fasciæ, tendons, subcutaneous and cellular elements, participating to a greater or less degree.

Nor can it be doubted that, in at any rate the more severe types of the affection, the sheaths of the contiguous nerve trunks are to a variable extent implicated by the surrounding interstitial inflammatory process, and occasionally also an extension to the related joint ensues.

We see, therefore, that it is the predominance of the pathological changes in the muscles, rather than their exact restriction to these structures, that enables us to classify any given case as one of muscular rheumatism or myo-fibrositis.

Nomenclature.—Our conceptions as to the pathology of the disorder having undergone such material alteration, it follows that the terms employed to designate it also call for modification.

To begin with, the term *myalgia* may be dismissed as inaccurate, in that it implies the absence of any anatomical lesion, and, moreover, apart from this, the term is misleading, suggesting as it does that the pain in so-called "muscular rheumatism" is of neuralgic or spontaneous character, whereas it is essentially evoked by movement.

Again, the designation *myositis* is scarcely appropriate, as the muscular tissues proper are only secondarily involved, their interstitial tissues being the state of the primary morbid change.

We, therefore, prefer the term *myo-fibrositis* or *muscular fibrositis*, indicating as it does more exactly the structures primarily implicated—the fibrous elements of the muscles—while at the same time it commits us to no assumption as to its intimate pathogeny.

Classification.

But little consideration suffices to show that, whether viewed from their clinical or pathological aspect, none but a purely arbitrary distinction can be drawn between the acute and chronic types of muscular fibrositis. (For the acute sometimes lapses into the chronic form, while this latter, moreover, once well established, undergoes from time to time acute exacerbations.)

Indeed, as we have remarked in the etiology, there is reason to doubt whether a really sound or healthy muscle is ever suddenly attacked by acute muscular rheumatism.

That the onset of acute muscular rheumatism is often surprisingly abrupt is certainly true, but it by no means follows that the morbid process of which it is the expression has been as suddenly developed.

Regarded in this light, these fulminant types of muscular rheumatism may not be really acute attacks of the malady, but the outcome of a chronic pathological change in the affected muscle, which has been developing silently.

Subject to these reservations, we may, however, assume that, generally speaking, in the acute types the inflammatory process is comparatively ephemeral, marked by mere cellular infiltration, with little or no tissue proliferation.

Nevertheless, even in these cases the morbid process, more often than is believed, culminates in the formation of *fibrous nodules or thickenings*. These anatomical lesions, once developed, constitute the most definite criterion by which one may differentiate between the acute and chronic varieties of muscular fibrositis.

To sum up, in the more benign forms of the acute variety the small-celled infiltration into the interstitial tissues undergoes complete resolution. But in the more intense forms, as well as the chronic types, the inflammatory exudate invariably becomes organized, the resulting fibrous overgrowth, indeed, constituting the salient objective characteristic of "chronic rheumatism."

Clinically speaking, therefore, muscular fibrositis is divisible into two main categories:

1. The *acute variety*, divisible into generalized and localized forms.
2. The *subacute or chronic type*, likewise of generalized or localized distribution.

In regard to the former, the disorder may take the form of an acute fibrositis with more or less diffuse involvement of the fibro-muscular structures throughout the body.

Or such acute types may be strictly limited to one muscle or set of muscles, such local varieties having long since been elevated to the dignity of special clinical syndromes—lumbago, torticollis, pleurodynia, and so forth.

The same widespread or localized distribution is met with in the chronic types of the affection, the picture presented naturally varying with the site, extent, and intensity of the pathological process.

Having defined the condition and dealt with its nomenclature and classification, it now devolves upon us to outline the manner in which we propose dealing with the subject.

Plan of Procedure.

We shall in the first place endeavour to present a clinical picture of the acute *generalized* type of muscular rheumatism, or myo-fibrositis, as, clinically speaking, it is more or less definitely marked off from the acute *localized* varieties of the affection.

This being achieved, we shall subsequently pass on to consider certain features which are common to all *acute types of localized muscular fibrositis.*

Under this heading we shall discuss from a catholic aspect the *mode of onset* and *general clinical features*, with an *analysis of the pain* in regard of its site, character, and the marked way in which it is influenced by voluntary and passive exercise of the affected muscle itself, as well as by the contraction of its synergic allies and antagonists.

In addition, too, we shall in this section consider in detail the three cardinal objective changes that take place in muscles, the seat of acute fibrositis—viz., *alteration in their tone*, *increase in their volume*, and *local rise of temperature*.

Lastly we shall discuss the *course* usually followed by the disease, and the *complications* and *sequelæ* that may ensue in these acute localized types of muscular rheumatism.

In a succeeding chapter we shall, on the same genera lines, consider *chronic muscular rheumatism* in regard of it salient clinical features, and likewise its objective phenomena.

In this portion we shall deal with that highly important question, the site and distribution of those nodular and diffuse infiltrations in the subcutaneous, fascial, and muscular structures, which form, so to speak, the anatomical groundwork of chronic muscular rheumatism.

Subsequently we shall pass on to the section devoted to *physical examination*, with observations on the technique to be followed for the detection of *subcutaneous deposits*, also *muscle indurations*, and *tendon nodules*.

On the basis of the facts forthcoming from the foregoing chapters we shall essay an explanation of the probable ultimate pathogeny of the acute and chronic types of the disorder.

By following this plan of considering, in the first instance, the symptoms and objective phenomena common to all types, whether of acute or chronic nature, we shall, apart from gaining the necessary bird's-eye view of this vast subject, save our reader and ourselves the irksomeness of avoidable reiteration.

In the remaining chapters we shall deal seriatim with the various *localized forms of muscular fibrositis*, and shall in the main adhere to the time-honoured division into *torticollis*, *pleurodynia*, and so forth. Such topographical differentiation is, of course, purely arbitrary, but in the matter of nomenclature not a little must be conceded to custom.

We shall ourselves, therefore, only modify the existing classification to the extent of enlarging its comprehensiveness. With this end in view, we shall consider muscular fibrositis as it affects muscles of (1) the head and neck, (2) the upper extremity, (3) the trunk, (4) the lower extremity.

Lastly we shall deal with such data as are forthcoming regarding this morbid process of fibrositis as it affects the fibrous elements of visceral structures.

CHAPTER VIII

ACUTE MYO-FIBROSITIS

Generalized Type.

From a clinical point of view this may be defined as a widespread disorder of the fibro-muscular structures, distinguished by pain and spasm, with a variable degree of pyrexia and constitutional disturbance.

This acute variety occurs in both sexes, and no age is immune, while its subjects, with significant frequency, are the victims of ancestral or acquired gout.

Of other predisposing factors, all that need be remarked is the uniformity with which such attacks are preceded by a period of functional derangement, usually some disturbance of the gastro-intestinal tract.

Of immediate or exciting causes, the most prominent are exposure to cold and damp, not infrequently associated with excessive muscular exertion.

Clinical Account.

Mode of Onset and Course.—This is acute, being marked by headache, furred tongue, and considerable febrile disturbance. In many instances a prominent initial symptom is sore throat, but more commonly gastric derangements anticipate or accompany the condition.

In the latter instance the general indisposition or malaise may precede by some days the rise in temperature and painful symptoms.

Lastly, in some types there is no indication whatever of any local affection, the subjects complaining of nothing beyond a vague feeling of malaise, best described by the non-committal term " febricula," or, to use the expression most in vogue among the laity, an " influenzal " or " feverish " cold.

But, be the initial symptoms what they may, the most plausible explanation appears to be a toxic state of the blood-plasma, giving rise to irritation of the fibrous tissues.

Almost invariably the patient ascribes his trouble to some recent exposure to cold damp air, as a result of which he became conscious of a chilly feeling, which after the lapse of a few hours was attended by more or less severe aching pains in the back and limbs.

These as a rule are referred to the muscles, but occasionally to the bones and joints, or, rather, to the tendinous structures which enter into relation with them.

The fleeting aches in the trunk and limbs, no less than the sense of malaise, render it irksome to the patient to be up and about, and he gladly resorts to bed or assumes a recumbent posture, pending the passing of this acute phase.

For exercise of any sort distinctly aggravates his sufferings, which, after the fashion of all other so-called "rheumatic affections," are decidedly worse at night.

In less severe cases the patient is able to pursue his ordinary avocation, though feeling listless and much plagued by a sense of unaccountable fatigue, which disinclines him for any effort or exertion.

At the same time the floating toxins often, though to a lesser extent, irritate the fibrous coverings of the nerves, and fitful neuralgic pains add to his general discomfort.

With this general body uneasiness there is associated a feeling of mental depression, frequently accompanied by irresistible drowsiness.

Commonly there is little or no appetite, and sometimes distinct nausea, while the bowels are sluggish.

Catarrhal ophthalmia is sometimes a prominent symptom, and unusual dryness of the nasal cavity and throat may be present.

In the more acute cases a considerable degree of constitutional disturbance is present with *pyrexia*.

Thus, forty-eight hours after the onset the body temperature may have risen to over 102° F., and in exceptional instances it may reach 104°, or even higher.

Profuse sweating and other features of a febrile state, a quickened pulse, and urine loaded with urates are also present.

It is interesting also to note the frequency of these acute generalized forms of muscular rheumatism in the lower animals —horses, cattle, dogs, etc.

Friedburger and Frohner have frequently observed in horses and cattle an elevation of body temperature to 104° or even 106° F., with increased rapidity of pulse and respiration, and often an associated catarrhal state either of the digestive or pulmonary apparatus.

Local Phenomena.—Apart from the widely generalized and shifting pains in the trunk and limbs, the underlying toxic element usually fixes itself more especially upon some one group of muscles, maybe those of the lumbar, scapulo-humeral, intercostal, or cervical regions.

Thus, in the epidemic form reported by Newton, the abdominal and lower intercostal muscles were chiefly involved, rendering respiration painful, short, and rapid.

In such acute forms the muscles at one or other of these sites undergo definite *swelling*, and in some instances *œdema* of considerable extent may be present, while at the same time the overlying skin is tense and shining.

The slightest touch or movement gives rise to intolerable suffering, and the muscles feel tense and are exquisitely sensitive to pressure or the slightest variation in tension.

In certain cases the muscles in spots show places of doughy consistency as a result of serous exudation.

The extreme hypersensitiveness of the parts, however, forbids a thorough examination to establish or exclude the presence of *nodules or thickenings*, and it is generally only after the decline of acute symptoms that they can be detected.

Commonly, such localized infiltrations are only gradually developed in the wake of repeated bouts of this nature.

Sick has recorded an interesting series of nine cases, occurring in epidemic form, among nurses and attendants living in the basement of a hospital.

The onset was heralded in all cases by malaise and gastric disturbances, and in some instances sore throat.

These symptoms were in one to three days followed by pyrexia and pain, swelling, and a diffuse or nodular infiltration of various muscles, usually the thighs, neck, or arm.

As showing the true nature of the cases, one was associated with acute articular rheumatism, and all were marked by a strong tendency to recurrence.

Blood-cultures proved uniformly negative, while there was no leucocytosis or eosinophilia.

Excised portions of muscle showed no histological changes, except in one instance, in which there was some clouding of the structure and slight infiltration with round cells.

No trichinæ were found, and bacterial stains of the tissues were also negative.

Sick considered that the results of tissue examination excluded all conditions save dermatomyositis and rheumatic fever, and inclined to regard it as an attenuated form of the former disease.

He was disinclined to regard it as a rheumatic myositis, as it did not conform to Lorenz's description, who held that it is characterized by short duration, limited localization, no histological changes, and no infiltration of muscle.

He admits, however, the disquieting factor of an associated typical articular rheumatism in one case, though he regarded the involvement of the respiratory muscles as inconsistent with muscular rheumatism.

In reviewing this interesting group of cases we must submit our belief that the condition was one of so-called "acute muscular fibrositis."

For reference to our section on morbid anatomy shows that the histological changes found are quite compatible with those noted by Strauss, Stockman, and others.

Again, involvement of the respiratory muscles was a marked feature of Newton's group of cases, while in opposition to Sick's own diagnosis of dermatomyositis we may note that the perivascular inflammation typical of this affection was absent in his examples.

Apropos of the local changes in the affected tissues, Friedburger and Frohner state that in animals the muscles feel tense and painful to the touch, and are of increased consistency, and sometimes their entire surroundings are in a state of œdematous swelling.

These acute varieties of muscular rheumatism, both in man and the lower animals, are usually of brief duration, passing over in a few days, or at most a week.

But there is always a tendency to relapse, each recurrence bringing with it increased liability to formation of nodules.

In reviewing the general clinical features of this generalized type of acute muscular rheumatism, it must be admitted that in their character and course they are very suggestive of *a specific fever of brief duration, but of hitherto undetermined origin.*

It is in this type, too, that the disorder occasionally displays a tendency to epidemicity, this being true both of animals as well as men.

In accordance with such a conception of its etiology, one may suggest that the infinite degrees of severity it presents are the expression of varying grades in intensity of the presumed causal infection.

Lastly, the importance of these acute forms is no doubt under-estimated, and the fact that they often form the starting-point of so-called "chronic muscular rheumatism" calls for more general recognition.

CHAPTER IX

ACUTE MYO-FIBROSITIS

Localized Types.

In accordance with the plan of procedure before outlined, we intend devoting this chapter to an *analysis of the salient clinical features common or germane to all varieties of acute localized muscular fibrositis.*

As opposed to the acute generalized form, the variety we are about to discuss presents in much less degree the characters of a constitutional malady, the severity of the local symptoms, as it were, dominating the clinical picture.

General Clinical Features.

Mode of Onset.—This differs markedly in one particular from that characteristic of the *diffuse or generalized variety,* in that it is as a rule determined by some trivial muscular effort or forced attitude entailing strain on the particular muscles to which the disease is subsequently localized.

The fulminant character of the onset is probably more apparent than real, the muscular effort being often so trifling that it cannot be doubted that it is not so much the cause of the malady as the occasion of its appearance.

Very commonly the disorder supervenes during a period of apparently exuberant health, this being especially true of those presenting a gouty diathesis. But for our own part we have found that, if inquiry be made, there are always indications of some previous functional derangement.

In some instances it sets in with mild febrile disturbance, these constituting about one-third of the cases, and in such there may be a catarrhal state of the fauces, or even definite tonsillitis.

There appears to be no constant relationship between the severity of the pain and the degree of pyrexia, for it is sometimes absent in the most acute types, while it may be present in the milder forms of lumbago, stiff-neck, etc.

It is, however, significant that, whether the condition be attended with pyrexia or not, the subjects usually present a coated tongue, diminished appetite, while the bowels are constipated, and the urine high-coloured or loaded with urates.

In view of the bacteriological and experimental data contained in our general etiology, we are inclined to believe that these variations in severity are merely expressive of the varying degrees of infection or toxic absorption, and denote the essential etiological unity of the generalized and local varieties of acute muscular fibrositis.

Subjective Symptoms.

The salient and only constant symptom, indeed, is pain in some individual muscle or group of muscles, such as those of the lumbar or cervical region.

Characteristics of Pain.—The pain is only present when the affected muscle or muscles are thrown into action, and wholly disappears if complete relaxation of the parts involved can be secured.

In the most acute cases this desired end is hardly ever to be achieved, so exquisitely sensitive is the muscle to the slightest variation in tension, however produced.

The least deviation, indeed, from the position of ease attained instantly arouses excruciating pain of a spasmodic character, which continues until relaxation is once more secured.

It will be seen that the muscular pain is not spontaneous, though to the patient it may well appear to be so; but, as a matter of fact, the production or aggravation of existing pain can always be traced to some slight change in posture, involving compression of, or any strain upon, the hypersensitive structures.

Passive Movements.—Apart from the pain inseparable from volitional or active movement, any attempt at passive exercise of the affected muscles, by reason of the increased tension it produces, is equally distressing.

Thus, for example, in acute fibrositis of the scapulo-humeral group of muscles, passive movement of the joint causes intolerable suffering in the affected structures, which involuntarily contract to prevent its performance.

Indeed, in the more acute forms so intense is the anguish, and so powerful its inhibitory effect on movement, that the shoulder-joint is apparently immobilized and ankylosis simulated.

While such instinctive contraction on the part of the muscles is obviously a defensive ruse, it unhappily fails of its end, for through the associated increase in tension the pain, far from being diminished, is intensified.

Synergic Action.—Moreover, apart from active or passive exercise of the affected muscles, the diseased structures are exquisitely sensitive to either volitional or passive movement of muscles functionally allied with them, and with which they are accustomed to co-operate.

Thus, to continue our example, in acute scapulo-humeral fibrositis, as we have seen, direct passive movement of the affected group is intolerably painful.

But, more than this, if those of the forearm be moved through flexion or extension of the wrist, contraction, and therefore acute suffering, will still be simultaneously aroused in the shoulder muscles accustomed to participate with them.

Nor does this exhaust the sources through which pain may be evoked in the affected muscles, for they are equally intolerant of any movement on the part of their antagonists.

This is strikingly exhibited in some forms of acute lumbago, where the diseased muscles reverberate painfully to the slightest alteration in tension on the part of their opponents, with which they are so intimately associated in the maintenance of equilibrium and so forth.

We thus see how profoundly under the influence of the morbid process the functions of the affected muscles are disorganized in all spheres of their activity, whether invoked volitionally, passively, or indirectly through the action of their synergic allies or their antagonists.

Objective Changes in Muscles.

Muscles, the seat of acute fibrositis, present three cardinal features:

1. An alteration in their tone.
2. An increase in their volume.
3. A local rise of temperature.

These phenomena are of course common to both the diffuse and localized types of acute fibrositis, but the widespread nature of the affection in the former and the attendant malaise are almost such as to forbid an attempt, much less that careful and repeated examination necessary to establish the presence or absence of the changes we are about to describe.

The *alteration in tone* that ensues in "rheumatic" muscle first calls for our attention. Now, as we know, all skeletal muscle are in a state of tone—in other words, in a condition of sustained slight contraction, varying with their extension.

This tonicity may undergo increase or diminution; thus, for example, it may be augmented under physiological contingencies —*i.e.*, during muscular effort.

This of course is a *physiological hypertonus*—in other words, an increase of a normal state, due to an increase in the intensity of normal stimuli.

Now, all writers from time immemorial have commented on the fact that in acute muscular rheumatism the diseased structures, by reason of their excessive irritability, pass into a state of *peculiar spasmodic contraction.*

In other words, the degree of their contraction exceeds the limits of normal variation, and so a state of *hypertonus of pathological or abnormal degree* prevails in the affected muscles.

That this is so is easily ascertainable by careful palpation of any muscle, the seat of an acute attack, and comparing it with the corresponding and unaffected muscle on the opposite side.

Let us take, for example, the clavicular bundle of the trapezius muscle, very commonly at fault in acute rheumatic torticollis. It will be found on palpation to be in a state of undue tenseness, this being immediately increased if any pressure be made upon it.

If the healthy muscle on the opposite side be examined in the same way, the sensation conveyed to the examining finger is entirely different, merely a feeling of softness.

Moreover, palpation causes no contraction of the muscular bundle pressed upon, as in the hypertonic muscle on the opposite side.

This unusual tension of the muscle constitutes to our mind the salient objective characteristic of the " rheumatic " muscle.

The state of hypertonus is certainly more easily recognized in those muscles lying superficially than in those covered or enveloped by fascia.

For, obviously, muscles, such as the sterno-mastoid, trapezius, and levator anguli, are by reason of their anatomical peculiarities more accessible to palpation, standing out as hard, tense cords, and any variation in their tension is consequently easily estimable.

On the other hand, in other regions—as, for example, the thigh, where the muscles are enveloped by the fascia lata, and, indeed, are individually enclosed by extensions of the same covering—it is impossible to appreciate individual muscles.

For the muscles when swollen distend the ensheathing fascia lata, which, therefore, presents a uniform board-like surface.

Again, in the lumbar region the same conditions prevail, the stretching of the lumbar fascia by the tense and swollen muscles beneath forbidding any appreciation of their individual contours during the acute stage of the disease.

But with the subsidence of the acute phase of the malady and the decline in general tension it will be found possible to identify the chiefly implicated muscle, inasmuch as the swelling and increased tension persist longer in it than in neighbouring less affected or healthy muscles.

Increase in Volume.—In the acute stages the muscles are swollen, and in severe instances the overlying skin is tense, shining, and œdematous.

The swelling displays wide variations in individual cases, and, although always present in acute attacks, it may when slight be difficult of appreciation. Frequently, indeed, not until after the swelling has declined is it possible to realize that there was a previous enlargement of the affected muscle.

In these acute cases the increase in volume, whether marked or slight in degree, is uniform throughout the whole muscle.

With the decline of the attack the swelling, like the hypertonus, diminishes gradually, though not uniformly, both these conditions tending to persist longer in those muscles which sustain the brunt of the morbid process.

While the enlargement in the majority of instances wholly disappears, in the more severe examples a greater or less degree of it may persist indefinitely.

Local Rise of Temperature.—The skin covering the affected muscles feels distinctly warmer to the hand than that covering the corresponding healthy muscles on the opposite side.

Now, heat production, like the power of contractility, is one of the specific properties of muscular tissue. Muscular exercise is associated with increased heat production, as the following experiment demonstrates:

If a thermometer be inserted between the thigh muscles of large animals, and subsequently the spinal cord be stimulated, then a rise of several degrees will be produced by resulting contraction of the muscles excited.

Now, rheumatic muscles are, as we know, in a state of hypertonus or heightened tension; and this being so, all the processes of muscle, including chemical changes and production of heat, are augmented.

It is conceivable, therefore, that, if a sufficiently large number of muscles be diseased, the aggregate effect of these several local overheatings will give rise to a general elevation of the body temperature.

Certainly clinical experience seems to indicate some interdependence between the degree of pyrexia and the extent of muscular involvement. Thus in the diffuse or generalized type the febrile phenomena are more pronounced than in the acute though localized forms.

The *course of the disease* is usually of brief duration, not exceeding as a rule eight to ten days.

The degree of pain affords us no certain index as to the probable duration of the malady. Indeed, the most acute forms of fulminant onset often clear up very rapidly, while the milder types of ingravescent onset supply us with some of the most protracted examples.

Something, too, depends on the actual site of the morbid process; lumbago, pleurodynia, and stiff-neck, being as a rule of much briefer duration than acute fibrositis of the scapulo-humeral and gluteal regions.

Throughout the acute stage, pain, hypertonus, swelling, and local heat persist in the diseased muscles. The gradual cessation of pain marks the passing of the acute phase, but it is too often taken for granted that with its subsidence the affected muscles are forthwith restored to their normal condition.

But, if inquiry be made, it will be found that a variable degree of stiffness and discomfort persist for a considerable period.

Moreover, there are many other additional indications that the reaction of the muscles is profoundly altered.

All of us who have suffered realize how sensitive the affected muscles remain to atmospheric changes, not to mention dietetic indiscretions.

The explanation that we would suggest is, that though with the disappearance of pain the tension and swelling of the muscles diminish, yet these objective phenomena, especially the hypertonus, outlast the subjective symptoms.

The persistence of this unusual tension is the direct consequence of the abnormal irritability of the rheumatic muscle, as shown by its exaggerated sensitiveness to the foregoing exciting causes.

So we see that with the cessation of pain the disease cannot be said to have wholly terminated. It has, in truth, merely entered upon a latent phase, which endures as long as the unusual tension remains.

Herein we have the clue to the pronounced tendency to recurrences so characteristic of the disorder, the unusual tension being merely the expression of the intense muscular irritability.

The fact cannot be too strongly emphasized that, though the excessive tension of the acute phase invariably diminishes, it does not wholly disappear for some time, and even a high degree of it may be present without giving rise to subjective symptoms.

Again, it is only when the hypertonic state of the muscle has lessened that the presence of nodules can be appreciated by palpation. Any attempt to ascertain their existence during the acute stage simply defeats its own end, for the hypertonus is thereby still more increased, and the nodules are in this way masked.

That this is so is shown by the fact that, in cases where during a quiescent stage the presence of nodules has been established, these same indurations, given a fresh acute attack, are by reason of the increased tension rendered temporarily inaccessible to palpation, only to reappear, however, with the decline of the tension.

From the foregoing remarks, it will readily be seen that the dividing-line between the acute and chronic forms of muscular fibrositis is very ill-defined.

Current opinion has it that the existence of nodules differentiates the chronic from the acute variety, but this attempt at cleavage has little to recommend it save convenience of description.

As we have seen, these indurations are not an exclusive feature of the chronic form only, being in our experience also integral phenomena of the acute variety.

That their occurrence in the latter is so often denied is, we think, an error of observation due to the persistence of hypertonus long after the subjective symptoms have subsided, whence the negative results of palpation.

But this much may be said, that, nodules or indurations once established, the case contains the elements which make for certainty of recurrence and chronicity of course.

Complications.—The more common of these are usually the outcome of an extension of the morbid process. As we have seen, fleeting neuralgias may complicate the acute diffuse form, but in the localized varieties this occasional *extension to the nerve sheaths* constitutes one of the most troublesome sequelæ. Thus, for example, lumbago is often complicated by sciatica, while scapulo-humeral fibrositis may terminate in brachial neuralgia, or haply neuritis.

Sometimes, too, the neighbouring *joint* becomes involved in the morbid process, though usually only to a slight degree; but very rarely the involvement of the joints assumes a more serious aspect. Thus, for example, an instance came under our own observation in which a case of ordinary stiff-neck passed into one of *acute articular rheumatism.*

It is worthy of note that in horses, also, this muscular form may be complicated by acute articular rheumatism, but, according to Friedburger and Frohner, such a complication is of more frequent occurrence in cattle.

In the lower animals, too, such intense forms are not infrequently followed by rapid death, and the severity of the symptoms have led in cattle to its confusion with epizoötic cerebrospinal meningitis.

Adler, who has devoted much special study to muscular rheumatism, calls attention to the fact that in his experience *endocarditis* appeared not infrequently in this association, likewise *petechial, erythematous, and urticarial lesions.*

We may add that in an instance under our own observation the patient, an ofttime sufferer from stiff-neck, developed during one attack an erythema nodosum.

CHAPTER X

CHRONIC MYO-FIBROSITIS

A STATE of chronic myo-fibrositis may be established in any voluntary muscle as a result of repeated acute attacks of the same nature, but very commonly it develops in an insidious fashion, pursuing a chronic course throughout.

Indeed, it may be said of the condition that it is essentially one slow of maturation, although even in this respect it displays wide variations in different individuals.

Some, for example, may have suffered from repeated acute attacks of the disorder at one or more sites, and yet these may have subsided without apparently leaving any objective trace in the shape of nodules or thickenings in the affected tissues.

Others, on the other hand, develop them even in their first bout, and it is significant that, apart from any question of acute articular rheumatism, such fibrous formations have been met with in young children—possibly a relic of some localized type of myo-fibrositis.

General Clinical Features.

Except in those instances where the affection has directly originated in some previous acute attack, the mode of onset is indefinite.

The responsible pathological process being a vitiated or toxic state of the blood-plasma, it is easy to realize that the induced inflammatory exudation into the fibrous tissue will vary widely in intensity, extent, and distribution.

While the muscles are predominantly the seat of the morbid process, it often coincidently, though to a lesser degree, implicates the fibrous coverings of nerves or the similar investments of the joints.

Commonly also the fibrous tissues of the skin and subcutaneous connective-tissue layers, and likewise the various aponeuroses, are similarly involved.

This being so, it follows that the clinical manifestations will be correspondingly diverse, hence the polymorphic aspect of the disease.

Thus, should the formation of fibrous overgrowths be widespread, the aching and stiffness will be coextensive, individual muscles or groups of muscles in different regions being simultaneously affected.

Such examples are, fortunately, rare, as in the vast majority of instances the morbid process is distinctly localized, with a decided predilection for affecting the interstitial fibrous tissues at certain sites.

While the disorder in some instances pursues throughout a distinctly subacute or chronic course, in the majority the clinical picture presents the aspect of a series of acute attacks linked together by aching and stiffness.

The site of the pain is determined by the actual location of the infiltrations, which once established, the patient, so to speak, stands perpetually on the verge of acute attacks, owing to the incessant and unavoidable influence of the various exciting causes always at play.

The symptoms during such exacerbations are simply those of an acute attack, but with this difference—that with every recurrence they tend to become more and more prolonged, and recovery is incomplete.

Thus, while in initial acute attacks the disorder terminates at the most in a few days, the exacerbations of the chronic variety may continue for weeks, the severity of the aching and stiffness only declining very gradually, and often persisting until the next aggravation of the disorder.

Such relapses or exacerbations are determined by exposure to damp, draughts, excessive exertion, or strain, as well as by gastro-intestinal derangements.

While the foregoing brief résumé outlines the general trend of chronic muscular rheumatism, it now remains for us to point out the salient differences between the acute and chronic forms.

To summarize, those of the *acute* type are intense pain, swelling, and heat of the affected muscle, which is also in a state of unusual tension or hypertonus, leading to functional disability in all spheres of its activity.

As opposed to this, in the *chronic* form the subject, save in the periods of exacerbation, is tormented with aching and stiffness, rather than actual pain.

The muscle is, as it were, hampered rather than actually disabled in its movements, and passes with abnormal readiness into a state of fatigue.

Swelling, so prominent a feature in the acute types, is much less so in the chronic, and, indeed, may be wholly absent or replaced by actual decrease through atrophy of the affected muscle.

While intensity of reaction, as shown by local heat, is well marked in the acute forms, it is much less so, and even wholly absent, in the chronic, save during exacerbations.

The exalted tension or tone of the muscle which prevails in the acute types is, however, also a feature of the chronic, but, save in the periods of exacerbation, is much less in degree.

Lastly, the presence of *nodules and infiltrations* is a far more constant feature of the chronic types, and although we differ, yet by many they are considered to form an absolute line of demarcation between the two types of the disorder.

With this brief résumé of the salient features of chronic muscular fibrositis, we now pass on to a detailed consideration of the individual symptoms.

Site of Pain.—It is by no means always easy for the patient to locate the exact spot where the pain is situated, and this is especially the case when large aponeurotic areas are either coincidently or independently implicated.

In such a condition palpation will usually show that, beyond diffuse tenderness, there are certain spots hypersensitive to touch, and pressure upon which is followed by the reproduction or aggravation of the particular pain or discomfort complained of.

Again, if it happen that the myositic deposits impinge upon or lie in contiguity to a nerve trunk, the pain in this instance may radiate to distant or peripheral parts.

Thus, for example, fibrositis of the deltoid muscle accompanied by nodular infiltration may, through the pressure it exerts on the musculo-spiral nerve, give rise to abnormal sensations in the thumb and fingers.

In the same way, the sole symptom indicative of similar deposits in the gluteal fasciæ and muscles may be pain radiating along the sciatic region, while like formations in the same structures of the neck are not infrequently at the root of obscure headaches.

These facts cannot be too strongly emphasized, for the overlooking of such nodules or thickenings in the fibro-muscular structures constantly leads to the erroneous diagnosis of neuritis, neurasthenia, hysteria, and many other conditions.

Careful and repeated palpation of the muscles, therefore, in all pains of obscure nature is imperative, as only in this way can the presence or absence of nodules be established, and the true nature of the case thoroughly grasped.

Character of Pain.—This wearies the subject rather by its persistence than by its severity, taking the form of a heavy, absorbing ache, which at times is replaced by pains of a neuralgic or lancinating character.

In this latter instance it is often to be traced to a nodule impinging on, or lying in contiguity to, some nerve trunk.

Aggravations of pain are frequently precipitated by some sudden movement, which, compressing a sensitive induration, provokes a spasm so intense as to transfix the patient by its startling and disabling severity.

The aching and stiffness are, it should be especially noted, most marked in the early morning hours, but lessen with exercise as the day wears on.

This is equally true of the condition as it occurs in the lower animals, but in both instances, if the exertion be too prolonged, it is infallibly followed by an aggravation of the stiffness.

Hard riders to hounds frequently suffer from muscular fibrositis, and not seldom the nags that carry them.

Thus, a hunter may leave his stable after a night's rest palpably "shoulder-lame," and his rider likewise may feel "tied in" at shoulder or hip, and in both their stiffness passes as they warm to their work, but it does so only to recur with aggravated intensity when the run is over.

We are in this way faced with the apparently contradictory fact that, while moderate exercise proves beneficial to muscular fibrositis, both rest and inordinate exertion exert a prejudicial effect—a discrepancy we shall attempt to reconcile in the section on Pathogeny.

Again, in keeping with the old belief that the pain in chronic as in acute rheumatism is more severe at night, the stiffness and general discomfort usually become worse as the subject gathers warmth in bed.

Indeed, so much is this the case in some that, after the preliminary stiffness in the morning has worn off, they practically suffer no inconvenience till they are again between the blankets.

Although these nocturnal exacerbations have from time immemorial been attributed to the agency of heat, it is by no means certain that warmth *per se* is really responsible.

For, although it undoubtedly aggravates the pain in many instances, in others it distinctly alleviates it.

Moreover, this intensification of the pain in the night season recurs just as inevitably in these patients when for some reason or other they do not retire to bed, as when they are ensconced beneath a load of bedclothes.

Rheumatic muscles, too, are extraordinarily sensitive to variations in temperature, especially if these exert their action on the area of skin directly covering the affected muscle.

Such influences are especially effective when, as is commonly the case, the skin over the involved muscles sweats profusely.

Thus, for example, a local hyperidrosis of the loins, by leading to soaking of the adjacent underclothing, and consequently to local cooling, almost infallibly induces an exacerbation, and thus a vicious circle ensues.

Not only also, as before alluded to, does violent or prolonged muscular exertion give rise to exacerbations, but even the maintenance of some posture involving slight strain is equally fruitful of relapses or aggravation.

Nor need we dwell at length upon the well-recognized swiftness with which rheumatic muscles respond to dietetic indiscretions, whether in the way of food or alcoholic stimulants.

Lastly, we have in the etiology commented on the peculiar sensitiveness of rheumatic muscles to sudden variations in atmospheric pressure, and at the same time have alluded to the possibility of their being similarly influenced by changes in the radio-active content of the atmosphere.

In conclusion, the fact that rheumatic muscles respond in this abnormal manner to these varied sources of irritation illustrates very distinctly their heightened state of irritability.

Moreover, such reaction is distinguished from that of normal muscle not only by its intensity, but also by its painfulness and its persistence even after the irritant has ceased to act.

Indeed, the constancy of this abnormal reaction on the part of rheumatic muscles almost justifies one in ascribing to it a specific quality peculiar to this disease.

We must now pass on to consider the objective phenomena, and the influence they exert on the symptoms and course of chronic muscular fibrositis.

Objective Phenomena.

Much scepticism has prevailed as to even the very existence of these foci of so-called rheumatic inflammation. By many, indeed, they have been dismissed somewhat contemptuously as errors of observation, while others of more open mind regard them as due to localized spasm or contraction of the diseased muscle.

But it cannot be doubted, as Adler contends, that the old conception of " myalgia without anatomical lesion " is the outcome of perfunctory examination; and of the truth of this somewhat severe comment anyone who studiously palpates the affected structures can readily assure himself.

Nor is it necessary any longer to beg the question, as, happily, excision and subsequent microscopic examination have shown them to be of the nature of diffuse or focal connective-tissue hypertrophies.

These areas of exudative hyperplasia frequently develop in the *subcutaneous, adipose, and cellular tissues*, constituting the condition long since familiar to the Swedish school under the term *panniculitis*.

Apart from this, they are of very frequent occurrence in the various *fascial or aponeurotic layers, in striated muscles, and in the sheaths of nerve trunks*.

It is important to grasp this ubiquity in distribution of the deposits, as otherwise the significance of the varied symptomatology of so-called "chronic rheumatism" will not be fully appreciated.

The inflammatory lesions may be isolated or multiple, and in extent, contour, and consistency, display the widest variation, and we shall proceed to describe in the first place those met with in the deeper layers of the corium and subcutaneous tissues.

Panniculitic Deposits.—While the inflammatory fibrous hyperplasia may be restricted to the panniculus adiposus, it very frequently goes hand in hand with a corresponding change in the interstitial fibrous tissues or sheaths of the subjacent muscles.

These panniculitic areas as a rule are small and circumscribed, not exceeding 1 or 2 inches across, and they may be smooth or broken in surface, in the latter instance giving the impression of an aggregation of small shot-like bodies. They are more frequently situated on the trunk than on the limbs, and in our experience more commonly in the abdominal than the thoracic region.

It sometimes happens that a patch of panniculitis exactly overlies, and thus conceals, a similar deposit in a subjacent muscle, the latter being only appreciable after the dispersal of the former by massage.

To distinguish between the superficial nodules and those situated in the muscles, it must be pointed out that the former are movable, and admit of a certain degree of displacement on the underlying muscular layer.

Also the deposits in the panniculus adiposus are extremely sensitive to pressure—far more so, indeed, than those located in the muscles, and this presumably because of the richer sensory supply of the skin.

Myositic Deposits.—Probably no voluntary muscle is immune from the development of these fibrous indurations, but certain muscles or groups of muscles may be aptly termed "sites of predilection."

Of these, the most noteworthy are *those of the head and neck, likewise the deltoid, lumbar, gluteal, and calf muscles.*

When of recent formation, they are ill-defined and of doughy consistency, and at this stage frequently undergo absorption.

But the longer they have been established, the firmer do they become, and, with the gradual increase and progressive condensation of the fibrous tissues, at length arrive at the consistency of a hard induration.

These myositic deposits are divisible into two groups:

1. Those developing in the belly of the muscle.
2. Those located in the tendinous attachments.

Clinically speaking, three stages of the morbid process may be distinguished:

1. The initial stage, characterized by puffiness or marked œdematous swelling of the affected muscle.
2. The stage of organization of the inflammatory products, evidenced by a change in the consistency rather than in the volume of the muscular tissues, which, while more resistant, are more or less impaired in respect of their elasticity.
3. The terminal or indurative stage, representing the end-product of the inflammatory fibrous hyperplasia, and marked by the presence of nodules or areas of cartilaginous density, retaining no vestige of that resilience typical of healthy muscular tissue.

This differentiation of the various stages is obviously to some extent arbitrary, and the transition from one into the other may not always be clearly recognizable.

Indeed, frequently the three grades of the morbid process may be detected at various spots within the same inflammatory area.

Nor, given discrete foci of inflammation in close contiguity, is it difficult to understand that all such will not necessarily mature at the same rate.

Going more into detail, certain differences in physical character distinguish muscle indurations as opposed to tendon nodules.

Muscle Nodules or Indurations.—These vary widely in shape and size according to the intensity and extent of the causal morbid process.

Oftentimes they are the outcome of an extension of the inflammatory fibrous hyperplasia from the overlying sheath or perimysium, and very commonly are continuous with a generalized fibrositis of the related aponeuroses.

In the latter instance the fascial coverings of some area of the body may be extensively indurated, and this obtains more particularly in the *lumbar*, *cervical*, or maybe the *gluteal* region.

It sometimes happens also that the *periosteum* is involved, this being more frequent in the case of intercostal and pectoral muscles.

Form and Site.—As a general rule, fibrous overgrowths, when situate in the belly of the muscle, tend to take the form of strands or cord-like thickenings.

These may run the whole length of the muscle, the diseased fibrous bundle stretching from the origin to the insertion.

In other instances they may be more circumscribed, forming oval thickenings, whose long axis coincides with that of the affected muscle.

Indeed, where the nodule is deeply situated, its tendency to run parallel with the fasciculi of the affected muscle may be used to determine the particular muscle in which it is located.

Consistency.—The consistency of these inflammatory infiltrations is very variable.

In the early stages they are of doughy consistency, but once organization has set in, they present degrees of hardness corresponding to the grade of sclerosis attained.

Thus, they may be on the one hand so soft as to be hardly distinguishable from surrounding healthy tissues, or on the other hand they may be of cartilaginous or even bony density.

Between these two extremes infinite gradations in consistency, according to the particular stage of condensation arrived at, may be met with.

Usually there is one outstanding central lesion, but careful palpation will often establish the presence of disseminated though smaller focal overgrowths of connective tissue.

In rare instances the muscle seems to undergo a generalized fibrositis, such a widespread condition being usually situated in the calf or peroneal muscles.

To sum up, it is possible to recognize three groups of cases according to the degree of involvement of the muscular tissue:

1. Those in which the disease is sharply delimited to the sheath and interstitial tissues of some individual muscle, this being the seat of isolated or multiple knot-like swellings separated by intervening portions of healthy tissue.

2. Those in which the inflammatory deposits permeate the entire substance of the affected muscle, such diffuse infiltrations being more frequently met with in the calf or peroneal muscles.

3. Mixed types characterized by connective-tissue proliferation implicating not only the muscles and their sheaths, but also the subcutaneous tissues, and even the cutis.

This leads to a welding together of contiguous muscles with each other and the surrounding tissues. Such intense and widespread fibrous tissue hyperplasias are chiefly to be met with in the cervical, dorso-lumbar, and gluteal regions.

Tendon Nodules.—Apart from those fibrous indurations which develop in the belly of the muscles, similar formations are more generally to be met with near the points of their insertion.

Thus, for example, they are of common incidence in the trapezii near their attachment to the occipital bone, or at the insertions of the nuchal muscles into the cervical vertebræ.

In their conformation they differ from muscle nodules, tending to be round rather than oval. In size also they markedly contrast, being very much smaller, not exceeding in size a pea, while muscular indurations may attain to a size of a walnut or date.

These tendon nodules lie close to the actual bony attachments, and, when multiple, give the impression of a row of beads, while they present an uneven surface, and are frequently of very great density or hardness.

Symptoms in Relation to Nodules.

Those nodules situated in the *muscle proper* may or may not give rise to symptoms, and such, even when present, vary greatly in degree.

One characteristic calls for especial notice, and that is the lack of spontaneous pain on the one hand, and on the other the constancy with which it is elicited by pressure.

This lack of spontaneity on the part of the pain is easily attested by the fact that in the intervals of attacks—say of lumbago—such muscular indurations are easily appreciable, and yet, despite their presence, there is an absence of any subjective symptoms, pain only being evoked when they are pressed upon.

We see, therefore, that the mere presence of nodules does not necessarily imply the existence of pain—at any rate, during the quiescent or latent period.

Albeit, it must be fully understood that, given an acute exacerbation, all nodules become tender to palpation or compression through muscular contraction.

As regards any relationship between the consistency of the nodule and its sensitiveness to pressure, the most definite proof of any such association is the fact that the softer the nodule, the more likely it is to be tender.

In this respect harder nodules show no constancy. They may or may not be intolerant of palpation, but, if tender, exquisite pain of a radiating character is often evoked, this being due to the involvement of a neighbouring nerve sheath.

The influence excited by *tendon nodules*, as opposed to those situated in the substance of the muscle, is somewhat striking, and requires consideration.

The tendinous tissues, as we know, are richly provided with peripheral sense organs, and these end-arborizations are especially sensitive to variations in tension.

It is, therefore, not surprising that nodules located in the tendons excite a very marked effect on the degree of tension or tone of the related muscle.

They are in the first place extremely hyperæsthetic to pressure—far more so than the muscle nodules. Their slightest irritation or compression immediately gives rise to spasmodic contraction or augmented tone of the affected muscle. This swift response on their part to stimulation by increase of tone accounts for the difficulty experienced in appreciating their presence by tactile palpation. For, embedded deeply as they are in the tendon substance near the bone, they are but too easily masked, when owing to their compression the overlying muscular fibres are thrown into strong contraction.

Now, these tendon nodules constitute the most constant objective phenomena of chronic muscular fibrositis, and being, moreover, potential sources of increased tension, we see that by reason of their extreme irritability the muscles are habitually maintained in a more or less excessive contraction or hypertonus.

In their presence we find the clue to the essential chronicity of the affection, for the nodule constitutes a flaw in the continuity of the muscle, a perpetual menace to functional integrity.

In other words, a muscle, the seat of rheumatic nodules, is, as it were, in the position of a muscle disabled by trauma, and, after the same fashion, displays a pronounced tendency to pass into a state of spasmodic contraction under the slightest irritation.

This condition of hypertonus seems to afford a plausible explanation of the stiffness invariably complained of by these patients, this symptom being presumably due to the inability of the muscle to relax swiftly and completely.

In the same way, we take it, the mechanical disadvantage under which a hypertonic muscle acts is reflected in the abnormal ease and swiftness with which a state of fatigue is induced in the affected muscle.

To sum up, this *increase of muscle tone or hypertonus* constitutes to our mind the most constant and fundamental change that ensues in muscles attacked by fibrositis.

It is present throughout the various phases of the affection, not only in the acute and chronic, but also in the latent periods—*i.e.*, those lacking subjective symptoms.

In the *acute* forms it stands at its highest grade, but subsides gradually with the decline of the subjective symptoms.

In the *chronic* forms it is a constant feature, though less in degree, becoming, however, augmented during the incidence of exacerbations.

It is, however, its persistence during the *quiescent* periods that constitutes to our minds its chief importance. While this persistence of hypertonus is not necessarily associated with, or dependent upon, nodules, there is no doubt that these, when present, are by reason of their sensitiveness constant causes of increased tension.

These muscular indurations and tendon nodules are, like the hypertonus, present even in the latent periods.

Indeed, this triad of objective changes may be said to constitute what is known as the *rheumatic predisposition.*

In other words, that vague and shadowy constitutional warp, known as the "rheumatic diathesis," finds expression, or rather becomes incarnate, in *heightened muscular spasm, nodule, and induration.*

In the presence of these three factors, any individual becomes potentially a rheumatic subject, prone at any moment to develop acute manifestations under the influence of the various exciting causes.

Complications and Secondary Effects.

Having regard to the fact that an inflammatory condition of the fibrous tissue is the basis of the affection, it is easy to understand that the morbid process will frequently and simultaneously involve the fibrous tissues of other sites.

Thus, not uncommonly the *ligaments and fibrous structures of the joints* participate, but usually only those articulations are involved which are specially related to the diseased muscles.

It is rare, therefore, for more than one or two joints to be involved, and they as a rule are not swollen, and display neither heat nor redness.

Thus, for example, in fibrositis of the deltoid not infrequently the capsule of the joint is implicated, and occasionally the morbid process extends even to the neighbouring *nerve sheaths.*

We have an analogy, too, in the lower limb, as witness the frequency with which fibrositis of lumbar muscles through extension of the morbid process eventuates in sciatica.

Although in the first instance the general health may undergo little or no deterioration, the condition, if neglected, may linger on indefinitely, and but too often incapacitates its victim for an active life.

Sufferers from the more inveterate type of the affection, as a result of the intolerable stiffness which follows exertion, are but too apt to adopt a more sedentary habit of life.

In consequence their general health very commonly suffers, and the nemesis of obesity frequently overtaking them further disinclines them for muscular effort, and coincidently any latent gouty tendency is accentuated, and with it their proneness to recurring attacks.

In others, however, the reverse happens, and, instead of waxing fat, under stress of continuous pain their nerve capital is seriously encroached upon, and the individual becomes emaciated and *neurasthenic.*

Arising often in the first instance as a result of chronic dyspepsia, their digestive incapacity becomes further aggravated as a result of nerve exhaustion, and a vicious circle is thus established.

Should the objective nodules and thickenings be overlooked, the condition passes from bad to worse, and the nerve element coming more and more into prominence, the patient runs a good chance of being dubbed a neurasthenic, or haply *une malade imaginaire.*

It is not too much to say that herein lies the clue to many an instance of obstinate recurring headache, or maybe inveterate backache, an overlooked nodule in the nuchal or lumbar muscles being the hidden *causa causans.*

In the same way a myositis of the recti abdominis sometimes simulates an intestinal colic, or even appendicitis, and we have known the diagnosis of renal calculus subsequently resolve itself into one of myositis of the abdominal wall.

Also, in common with others, we ourselves have noted the presence of *cardiac complications* in middle-aged and elderly people the subjects of fibrositis, and this without any history of syphilis, acute rheumatism, or any other condition known to be associated with endocardial changes.

Certain French authorities, we believe, claim that the condition is not uncommonly associated with *arterio-sclerosis ;* but, inasmuch as many of the subjects have entered upon the degenerative period of life, the possibility of this being merely a coincidence must not be forgotten.

CHAPTER XI

PHYSICAL EXAMINATION OF NODULES IN MYO-FIBROSITIS

A CERTAIN delicacy of touch must be developed by those who would discriminate readily between healthy and diseased tissues, and with this end in view, as Metzger says, it is essential that they should acquire *das normale fleischgefuhl.*

That the claims of Metzger, Norstrom, Helleday, Schreiber, and others have been looked at askance for so many years is partly due to the fact that objective proof as to the anatomical nature of their clinical findings was not forthcoming, and partly, no doubt, attributable to the superficial and perfunctory manner in which those opposed to them conducted their clinical examinations.

It is now admitted that the diagnosis by palpation of subcutaneous and even muscular indurations is perfectly feasible, inasmuch as it has been shown that the conclusions previously arrived at as to their histological structure have been repeatedly confirmed by the results of excision at the hands of Strauss and more recent workers.

Method of Technique.

On approaching the digital examination of the affected area it is advisable, but not essential, that the parts should be smeared with liquid paraffin, vaseline, or some such lubricant. There is no doubt that the liquid preparations are more suitable for this purpose than those of denser consistency, such as solid fats and powders.

Panniculitic Deposits.—The fingers being drawn gently over the site of pain, one can often distinguish a chain of bead- or shot-like bodies, but sometimes definite fibrous strands or bands may be traced running for some inches through corium and subcutaneous tissues.

The surface of the overgrowths, when small and discrete, is smooth, and the different sensation conveyed to the finger in its passage over the intervening healthy tissue is readily appreciable both in regard of resistance and consistency.

Moreover, the intermediate tissues are markedly less sensitive to direct pressure and lateral compression than the affected areas, while the overlying skin, if pinched up, is often puckered, evidently thickened, and less resilient.

When extensive involvement of the skin and subcutaneous tissues has ensued, as in the cervical, lumbar, or gluteal regions, a feeling of great brawniness, increased resistance, and diminished elasticity is readily noticed. The skin is firmly tied down to the deeper structures, and it is difficult, if not impossible, to roll up a small portion between the fingers.

Tactile sensibility over such areas becomes dulled, and its response to faradic stimulation distinctly impaired.

Periosteal Nodules.—These are located most frequently on the tibia, sternum, ribs, clavicle, and cranium. In the early stages, on passing a finger gently over the surface of the affected bone, one or more spots, swollen, puffy, and exquisitely tender, can be detected.

In the later stages the puffiness subsides, and the parts instead feel thickened, owing to the formation of firm, irregular, and projecting areas, which albeit are still painful to touch. They may not only be palpable, but visible, and in prominence, character of surface, contour, and sensitiveness, betray wide variation, while in length they range from 1 to 1½ inches.

Examination of Muscles.

Normal muscles, unless roughly handled, do not respond to palpation or compression by contraction. They convey to the examining finger a peculiar sensation of softness combined with resiliency or elasticity. Moreover, unless contracted or in a state of extension, no feeling of undue tenseness is felt. In other words, the finger experiences no sensation of increased tension or exaggeration of tone.

Needless to say, slight variations from the normal tone are with difficulty appreciable, save after extended practice, and to attain this every opportunity of palpating healthy muscle should be taken advantage of.

Arrangement of Patient.—As a preliminary, it is essential that the patient's body should be so disposed as to secure as complete relaxation of the affected muscle as is possible.

Thus, for example, should the gastrocnemius be suspected, the patient should lie on his healthy side with the affected limb uppermost, the knee meanwhile being bent, and the ankle in a position of slight plantar flexion.

Again, if the deltoid be the one calling for examination, the forearm should be flexed, and the shoulder-joint placed in a position of abduction. This is preferably done by an assistant, as it leaves the physician free to palpate the muscle at fault.

To sum up, the essential point to attain is relaxation of the affected muscle by approximation of its bony attachments.

Mode of Palpation—Acute Stages.—In the first place, rough handling is to be deprecated, and especially in acute cases, where it is essential that any manipulation should be conducted as delicately and circumspectly as possible, otherwise secondary contractions are induced, and the already raised tone of the muscle is augmented. Indeed, during this period it may be quite impossible to palpate the diseased structures, because of their hypersensitiveness.

On drawing the fingers gently over the inflamed muscle, so gently that no secondary twitch or contraction is induced, it will be found that, besides feeling swollen and sensitive, the muscle will be unusually tense. Only, as before remarked, in the case of the more superficial muscles, the sterno-mastoid or the clavicular bundle of the trapezius, can this increased tension be appreciated, the muscle standing out as a highly-strung cord beneath the skin.

To properly estimate its degree, the muscle should be stroked, not in its longitudinal axis, but transversely.

To take another example, in acute lumbago, if the dorsal muscles be palpated while the symptoms are at their zenith, only a feeling of general tension and fulness is to be made out.

For it is impossible to discriminate the diseased muscle from those protecting it, all being uniformly contracted. The spasmodic contraction or exalted tone, however, persists longer in the chiefly affected muscle, and so, following the decline of general tension, such may be detected by its particular tenseness. In our experience in this localized type, it is the iliocostalis muscle which usually exhibits this phenomenon.

Again, in the more superficial muscles, when sufficiently tolerant of palpation, it is sometimes possible to detect in addition certain spots specially sensitive to pressure, which are soft and doughy in consistence from serous exudation.

But it is only long after the decline of the subjective symptoms in these cases that nodular infiltrations can be distinguished.

Chronic Stages.—Although, of course, at this period the muscles are more tolerant of palpation, the same carefulness should be exercised if the presence of muscle indurations or tendon nodules is to be satisfactorily made out.

The thumb or tips of fingers being drawn gently but firmly over the surface of the affected muscle, the presence of indurations can usually be ascertained forthwith. Should the first examination prove futile, as sometimes happens owing to sensitiveness, it will generally be found that on repeated handling greater tolerance is established, and deeper palpation being feasible, the nodules embedded in the muscle can be distinguished.

Whenever possible in long thin muscles, the suspected portion or even the whole length should be rolled between the fingers and thumb like a lead-pencil, and often by this movement of pétrissage *muscle indurations*, otherwise undetectable, may be found scattered throughout the muscular substance. By this manœuvre, too, or by pressure against the underlying bone, one is often able to estimate even slight alterations in consistence; and where firm nodules are present, such compression evokes sometimes a sensation of creaking.

In all instances palpation of the corresponding muscles on the opposite side should be carried out, as only in this way can slight departures from normal be recognized.

It is in the quiescent period, when tension is at its lowest, that nodules or infiltrations can most easily be detected.

While they present infinite variety in size, form, and consistency, they all present in common one important characteristic—viz., *sensitiveness to pressure.*

When we realize that these indurations during the interval of exacerbations give rise to no spontaneous pain, it will be seen how important a clue is furnished by this condition of hyperæsthesia, both as an indication of their existence and location.

The sites of predilection for muscular indurations will be treated of in succeeding sections devoted to detailed consideration of the localized varieties of muscular fibrositis.

Passing now from our consideration of muscle indurations to deal with *tendon nodules*, one must admit that they are vastly more difficult of detection than the preceding fibrous overgrowths.

For the slightest contact immediately has the result of augmenting the tension of the affected muscle, which thereupon assumes a smooth felt-like rigidity, and so their presence is often wholly masked. Fortunately, however, lying as they do close upon the bone, they can be pressed against its unyielding surface.

Needless to say that in tendon, as in muscle nodules, the first and all-essential condition for their detection is the production of complete relaxation on the part of the suspected muscle, and such procedures as may be necessary for its attainment will be more conveniently considered in later sections dealing with lumbago, gluteal fibrositis, etc.

We shall now pass on to consider certain sources of error which must be guarded against, lest our diagnosis of the presence of indurations or nodules be confused with other conditions simulating them.

Differential Diagnosis.

Localized Muscular Contractions.—Lack of the required delicacy in manipulation may initiate local muscular spasms. Though induced by digital pressure, such will also disappear again if the part be massaged gently, and this presumably as the result of established tolerance on the part of the hypersensitive structures.

They may closely simulate muscle nodules, but their appearance and disappearance, as well as their change of site from day to day, will aid in their differentiation. Moreover, they are not so sharply delimited as muscular indurations, and differ also in that they at no time lose their elasticity, while their surface is never uneven.

On the other hand, myositic deposits are usually well defined, and sometimes of ivory hardness, while their elasticity is diminished or abolished, and they are in addition very sensitive to pressure.

Swollen Glands.—These are sometimes confused with muscle nodules, but the globular shape of the former should distinguish them from the flatter contour of the latter.

Glandular swellings, too, are more movable, rolling under the finger, while muscular indurations, being an integral part of the muscle, can only be moved along with it.

Varicose Veins.—Traversing the muscles as they do, they may also prove a source of error through misinterpretation of the painful muscle cramps that sometimes accompany them.

Strauss advances a striking instance in which an induration, the size of a small apple in the soleus muscle, proved on incision to be a mass of connective tissue in which was embedded a thrombosed varix the size of a cherry. The existence of such a formation could only be hazarded by inference from the presence of other varices in the affected extremity.

Lastly, syphilitic gummata in the muscles, new growths, tuberculous masses, and calcareous trichinæ, have also to be borne in mind, not to mention certain stages of myositis ossificans.

It need hardly be said that only by a comprehensive and careful survey of the clinical condition in all its aspects can such sources of confusion be excluded, but it may also be stated that in comparison with this everyday affection—muscular fibrositis—these sources of fallacy are indeed most rare.

CHAPTER XII

MUSCULAR FIBROSITIS: PATHOGENY

General Remarks.

In this variety of rheumatism the muscles constitute the chief seat of the morbid process; and this being so, it will be wise, perhaps, to preface our study of the possible pathogeny by recalling to mind some of the salient histological and physiological properties of muscle.

Histology of Muscles.—The skeletal or striated muscles constitute about half the body-weight. Each muscle is swathed in a layer of connective tissue, its mass being made up of a number of individual muscular fibres, which are united into bundles by means of areolar connective tissue.

At each end the muscular fibres are firmly attached to bundles of tough white fibres forming its tendon, which is generally fixed to the bones.

Coursing through the connective-tissue strands permeating the muscle are a number of bloodvessels, capillaries, and nerves.

It will be seen at a glance that the framework of muscles is composed of white fibrous tissue—in short, the very textures in which the morbid process of muscular rheumatism is primarily situated.

Physiology of Muscle.—Now, all muscular movements are the outcome of the specific attribute of muscle—viz., power of contractility—and in their primitive form may all be regarded as examples of reflex action.

They occur in response to changes excited in the central nervous system by events occurring in the environment, and acting on the surface of the body.

More definitely each involves changes in a peripheral sense organ, an afferent nerve fibre, the central nervous system, and an efferent nerve fibre, before contraction of the muscle and the resultant movement ensue.

Now, in order to grasp the more intimate nature of the changes that occur in muscles as a result of the rheumatic process, we must devote some little attention to the structure of the efferent and afferent components of the reflex arc, more particularly the latter.

For the former, all that we need recall is that the efferent or motor nerves of voluntary muscle pierce the sarcolemma, and terminate in expansions called the " end-plates."

As opposed to this, the afferent nerves of muscles take origin in those peculiar bodies, the *muscle spindles.*

These sensorial end-organs, unlike the former, lie in the *interstitial fibrous tissues* of the muscles. Histologically they consist of one or more muscular fibres, often continuous with the general muscular substance, of which, indeed, they appear to be deflections.

The spindles lie in a sheath composed of several layers of fibrous tissue, with intervening lymph spaces; they are scattered throughout the muscle, and are more numerous in the neighbourhood of the intramuscular septa.

The spindles vary in length from $\frac{1}{8}$ to $\frac{1}{3}$ inch, and each receives one or more nerve fibres, which penetrate the sheath, and, winding round muscular fibres, break up into a network.

Apart from these neuro-muscular spindles, the tendons are furnished with end-arborizations of nerve fibres, which lie on the surface of the component fibrous bundles, the organs of Golgi and Ruffini. We see, therefore, that muscles and tendons are very richly supplied with sensory nerve endings.

Muscular Tone.

In health all skeletal muscles are in a state of sustained slight contraction, known as " tonicity " or " tonus."

Now, this muscle tonus for its maintenance depends directly upon the integrity of the reflex arc, and inasmuch as the state of muscular nutrition is dependent on a due supply of healthy blood, this factor must also be reckoned with as exercising a controlling influence on muscular tone.

Now with regard to all reflex actions, Sherrington has shown that they are associated with, and regulated by, afferent impressions, of which two main groups may be recognized—the " proprioceptive " and " exteroceptive."

Proprioceptive Impressions.

Under this title Sherrington groups those *secondary* afferent influences arising in the deep tissues—viz., muscles, joints, and ligaments—which, as we have seen, are all furnished with special sensorial endings capable of excitation by any mechanical changes of tension or pressure set up under the influence of movement.

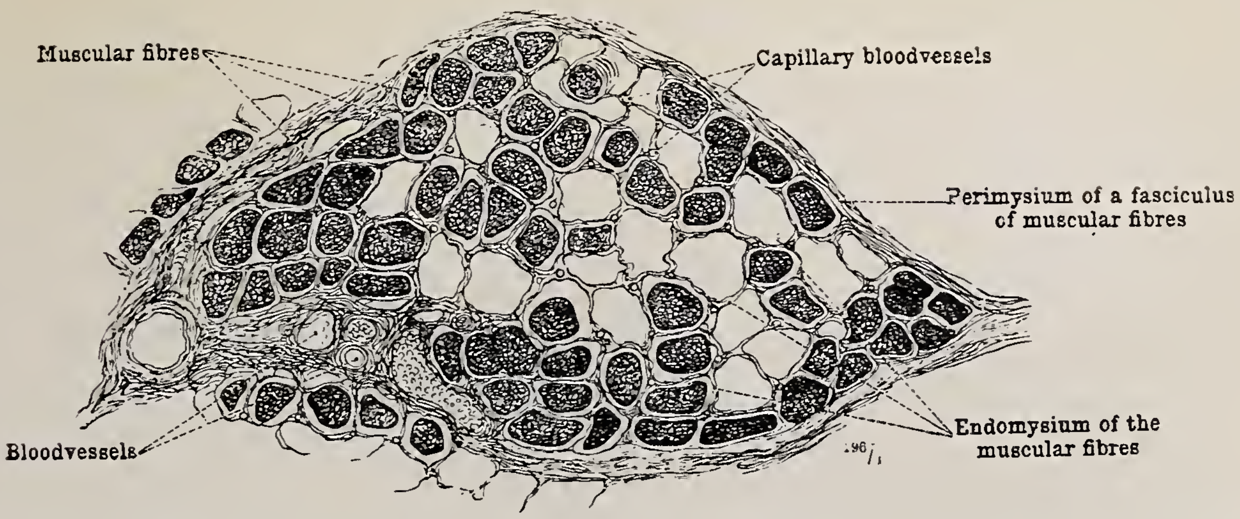

Muscular fibres
Capillary bloodvessels
Perimysium of a fasciculus of muscular fibres
Bloodvessels
Endomysium of the muscular fibres
196/1

FIG. 26.—Fasciculi of muscular fibres in transverse section. Some of the fasciculi have fallen out of the section. In the perimysium of the fasciculi numerous capillary bloodvessels are seen in transverse section. (From a transverse section of the human sartorius muscle, hardened in picric acid solution and alcohol.) (Toldt's Atlas.)

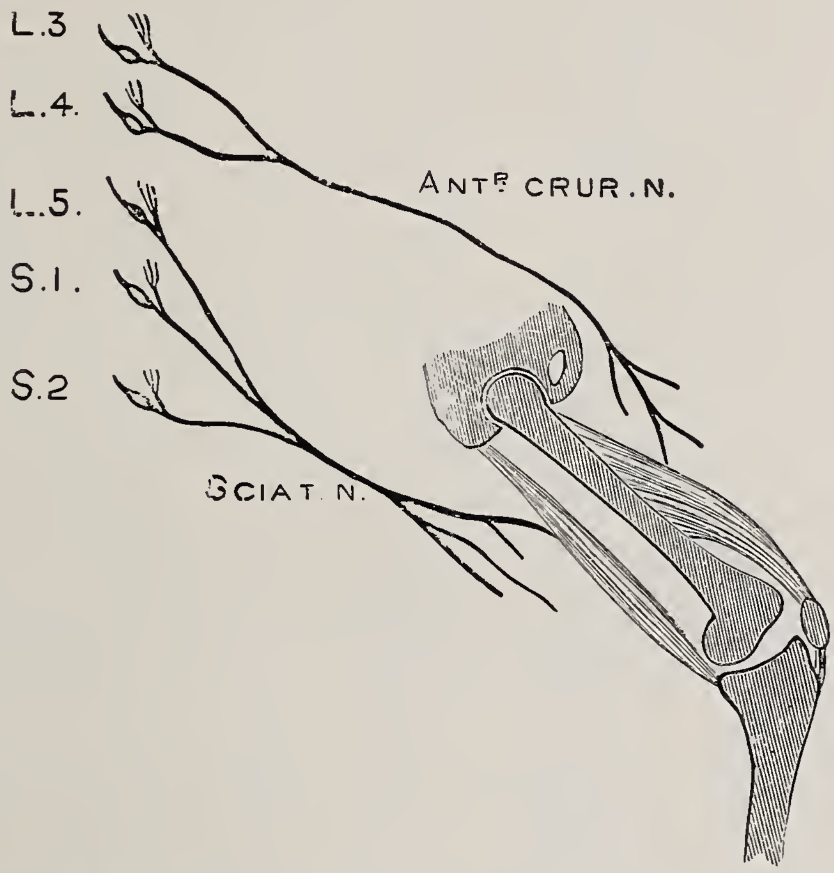


FIG. 27.—Diagram to show muscles and nerves concerned in Sherrington's experiment on the reciprocal innervation of antagonistic muscles.

L.3, L.4, L.5, Third, fourth, and fifth lumbar roots.
S.1, S.2, First and second sacral roots.

(*By kind permission of Professor E. H. Starling.*)

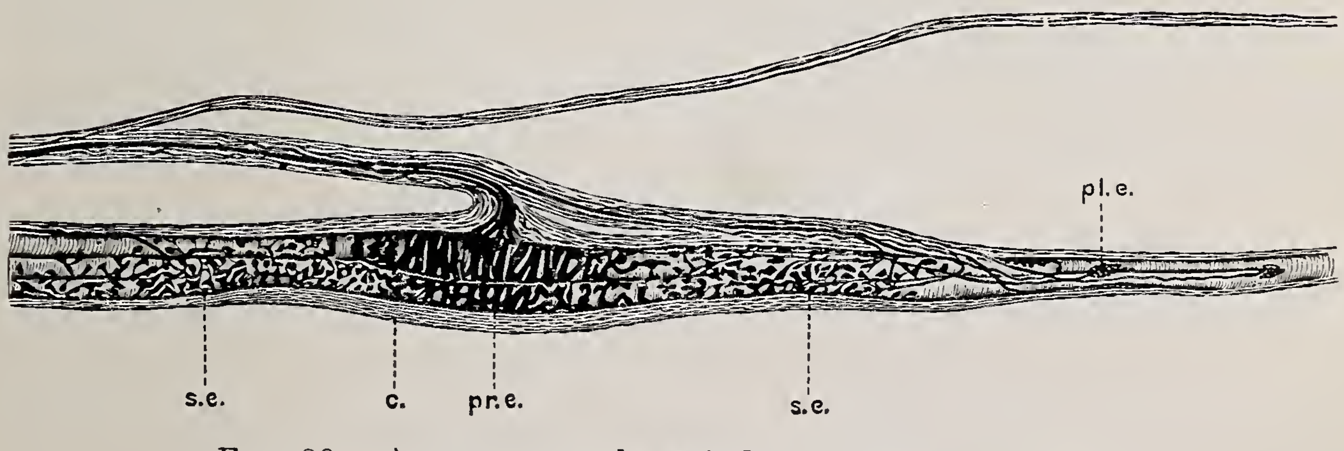


FIG. 28.—A neuro-muscular spindle of the cat. (Ruffini.)

C., Capsule ; *pr.e.*, primary ending ; *pl.e.*, plate ending. (All these are probably sensory in function.

(*By kind permission of Professor E. H. Starling.*)

To face page 188.

The important part played by these secondary afferent impulses in the due performance of muscular movements is shown by the inco-ordination which follows their section or degeneration.

On the other hand, no such ataxy results in sequence to section of the cutaneous nerves supplying the surface of the limb —*i.e.*, the exteroceptive afferent nerves.

From the point of view of muscular rheumatism, the important fact to grasp is that the steady slight contraction typical of healthy skeletal muscles—*i.e.*, tone—has been shown by Sherrington to depend on the integrity of the proprioceptive system of the muscles and their accessory structures.

We shall now pass on to discuss the variations from normal that occur in the functioning of muscles, the seat of rheumatism, as the result of alterations in the proprioceptive afferent system.

Altered Reaction of Rheumatic Muscle.—The fundamental change that takes place in rheumatic muscle as the result of the morbid process is one of altered tone. The muscles in this condition are in a state of excessive irritability, the direct outcome of which is that these structures, as we have pointed out, are in a condition of excessive contraction or hypertonus.

Their abnormal excitability is shown by the intensity of their response to normal excitants, the painful character of their reaction, and its persistence after the irritant has ceased to act.

Intensity of Response.—This is evidenced by the exaggerated sensitiveness of the muscle to physiological excitants of innervation.

As we know, even in health during contraction or extension of muscles, afferent impulses are continually passing from these structures to act upon the related spinal centres.

But normally the response to such " proprioceptive " stimuli, though adequate, is painless, and ceases with their withdrawal.

A certain proportion, it is true, of these impulses reach the cortex, and arouse states of consciousness, but only in so far as they are necessary for volitional movements.

But in the main the sensations of position, movement, or resistance, which are transmitted through their agency, are concerned with the *subconscious* regulation of the motor adaptations of the body to its environment.

But although the bulk of such impressions do not pass the threshold of consciousness, and consequently are unperceived, still, should these impulses for any reason become intensified, we instantly are made painfully aware of their existence.

The unpleasant experiences of cramp furnish us with evidence at first hand, and in the same way, if perchance any group of muscles—such as the lumbar—becomes the seat of acute fibrositis, we are painfully alive to the slightest variation in its contraction or tension.

Moreover, not only is the response of the affected muscles exaggerated and painful, but it is in addition unduly prolonged, persisting long after the exciting cause has ceased to be operative.

Influence of Passive Movements.—This hypersensitiveness of rheumatic muscles pertains not only to volitional muscular efforts, but also to passive movements. This, as we have shown, is due to the immediate secondary contraction excited in the diseased muscles under the influence of the slightest alteration in their tension, such as follows even gentle passive exercise.

As we have pointed out in the clinical section, this phenomenon is strikingly exhibited in fibrositis of the scapulo-humeral muscles.

That the pain produced is the outcome of the increase of muscular tension is shown by the fact that, given freedom from apprehension and complete acquiescence on the part of the patient, the same passive movement can be performed painlessly, always provided it be carried out with such gentleness and smoothness as to obviate sudden variations in tension.

Influence of Synergic Action.—A further proof of the extreme irritability of rheumatic muscles can be adduced in this connection. The execution of complicated movements is achieved through the co-ordination of muscles, and to this end muscles remotely situated from each other may yet be intimately correlated in function.

This has an intimate bearing on acute fibrositis of any particular muscle in that, not only is direct passive movement of the affected muscle intolerably painful, but equal distress is aroused in it indirectly by passive exercise of its synergic allies.

Again, should one or more of a synergically allied group of muscles be attacked by fibrositis, the execution of any special movement subserved by combined and harmonious action will be seriously hampered. For in the performance of any complicated muscular movement, not only do many individual muscles take part, but they must do so in orderly sequence, and also in due relation to the action of auxiliary and antagonistic muscles.

Now, the response of rheumatic and therefore hypertonic muscles is not only painful, but excessive. Moreover, their subsequent relaxation is incomplete, and more tardily effected than that of their healthy allies.

Consequently, their belated and painful co-operation, acting as a mechanical hindrance, will give rise to more or less disorder of movement or inco-ordination.

We have an analogy to hand in the phenomena of writer's cramp, for in the muscles of the forearm in these subjects nodules indistinguishable from those met with in fibrositis have been frequently detected by several observers.

Bearing of Reciprocal Innervation of Antagonistic Muscles.—As we are all aware, the contraction or shortening of one set of muscles involves the relaxation or elongation of its opponents.

Now, all skeletal muscles throughout the body being in a state of tone varying with their extension, it is obvious that, in the absence of any special arrangement, every contracting muscle, by stretching its antagonist, would *ipso facto* raise its tone, and thus automatically engender resistance to its own effective action.

In short, under such conditions every muscular contraction would be foiled of its endeavour by the resistance of its opponent, and thus the subject would be " muscle-bound."

But, as Sherrington's brilliant researches have shown, the necessary inhibition of the tonus of a voluntary muscle is automatically insured by the excitation of its antagonist.

It appears that normally the elongation of a muscle, which follows the shortening of its opponent, stimulates mechanically the sensorial end-organs of the muscle undergoing stretching or extension, and thus abolishes its tone.

Now, the phenomena exhibited in the more acute forms of muscular rheumatism seem to indicate that this automatic inhibition of tone is in some way interfered with.

Thus, all must have noted that in acute lumbago the subject, in the attempt to flex his trunk forwards, is brought up sharp, held in a vice as it were, and is for the nonce " muscle-bound."

Now, in the normal state, when flexion occurs through contraction of the ventral spinal muscles, their opponents, the dorsal extensors, undergo simultaneous elongation, this taking place easily and painlessly, owing to the automatic abolition of their tone.

Presumably, in acute lumbago, what happens is that, owing to the diseased condition of the lumbar extensor muscles, the usual inhibition of their tonus does not ensue, hence the sudden painful check.

We would suggest in further explanation that the muscle spindles, situated as they are in the inflamed fibrous tissues of the dorsal spinal muscles, become exquisitely sensitive.

Their response to excitation, therefore, is correspondingly excessive and painful; consequently the tone of the lumbar muscles, instead of being inhibited, is increased.

Now, we know that muscle tonus may be abolished by destructive lesions of the proprioceptive or secondary afferent nerves, as is seen from the inco-ordination of movements which follows peripheral neuritis when it affects the sensory nerves of the muscles.

In the same way, therefore, we would expect that merely irritative lesions of these same sensorial end-organs would augment muscular tone.

We must now pass on to consider the altered reaction of rheumatic muscles to the influences of muscular exertion, rest, and so forth.

Reaction of Rheumatic Muscles to Exertion.—While moderate exercise as a matter of practical experience has a beneficial effect on " rheumatic " muscles, it is no less certain that prolonged or violent exercise is a common cause of relapses or exacerbations.

Now, " rheumatic " muscles, by reason of their irritable hypertonic state, labour under a mechanical disadvantage, and it is, therefore, not surprising that they pass very readily into a state of fatigue.

The phenomena of fatigue are considered to be due, firstly to consumption of the contractile material, and secondly to the accumulation of waste products.

Now, a muscle in the state of hypertonus must, in virtue of its excessive and prolonged contraction, consume a greater amount of contractile material, and its reserves will, therefore, be more readily exhausted.

Furthermore, we know that as a result of increased tension all the processes of muscle metabolism are largely augmented. It is clear, therefore, that on both these counts the staying power of a " rheumatic " or hypertonic muscle is much impaired.

If to this be added the fact that the circulation through a " rheumatic " or hypertonic muscle is very greatly hampered, we see how heavily they are handicapped for any prolonged exertion.

For, in healthy muscles any toxic fatigue stuffs are swiftly washed out, but the removal of metabolites in " rheumatic " muscles is more tardily affected, hence fatigue appears sooner and persists longer. Moreover, if overworked, the muscles not only become tired, but intensely painful, the aching and stiffness persisting indefinitely.

As to the cause of the augmented pain, we would suggest that the variations in tension inseparable from hard muscular exercise mechanically excite the already hypersensitive muscle spindles.

Possibly, too, as we have suggested before, the toxic fatigue stuffs, by irritating the fibrous tissues, still further increase the excitability of the end-organs, and so through these two influences that fundamental change in "rheumatic" muscle, *hypertonus*, is perpetuated.

Reaction to Rest.—No peculiarity of "rheumatic" muscles is more striking than its behaviour towards "rest," for, contradictory as it may appear, "rest" or muscular inactivity, like excessive or violent exertion, undoubtedly seems to aggravate their condition.

We have, however, an analogy in support of this seeming paradox in that muscular cramps are extremely prone to come on at night, after hours of profound sleep, under precisely those conditions in which the most complete muscular repose prevails.

The same is true of "muscular rheumatism." It is always prone to be worse after waking from a night's rest.

In this connection we may remark that horses, when afflicted with "muscular rheumatism," are sometimes slung up at night, so as to obviate the difficulty of getting them on their legs when their muscles have stiffened after a night's rest upon their ordinary litter.

This tendency for the symptoms of muscular rheumatism to undergo spontaneous increase, even under the least irritating conditions, is somewhat difficult of explanation.

Rheumatic muscles are undoubtedly in a state of hypertonicity, and one is driven to conclude that under conditions of rest it undergoes a spontaneous increase in degree.

As to the *causa causans* of such augmentation in tone, we must bear in mind that we are in the presence of abnormally sensitive muscle spindles alive to the slightest variation in tension, such as may be produced by unconscious movements or the assumption of strained postures during sleep.

To conclude, we have in the foregoing sections endeavoured to show the altered reaction of rheumatic muscles to proprioceptive stimuli originating in the body itself.

We have now to allude to similar evidences of their abnormal irritability to changes in their environment—in other words, to impressions received through the exteroceptive system.

Exteroceptive Impressions.

Under this heading are comprised those impulses referable to extraneous or environmental changes, which are transmitted through the peripheral sense organs on the surface of the body.

These "receptors" are of different qualitative sensibility, and respond to mechanical stimuli of various kinds.

Stimuli of Pressure.—Now, palpation of normal muscle causes no reaction, but "rheumatic" or hypertonic muscles immediately betray their resentment of it by contraction of the muscular bundles pressed upon.

This intolerance of pressure adds in no small measure to the discomfort of patients attacked by acute fibrositis—say in the shoulder muscles. For, try as he may, it is difficult for a person thus affected to find even in bed a comfortable pose, so exquisitely intolerant are the inflamed muscles of any compression by bedclothes and so forth.

Variations in Temperature.—The fact that rheumatic muscles are extremely sensitive to those influences is well established. The infallible manner in which exposure to cold, damp, or draughts excites relapses or exacerbations is too well founded to need further comment. All that we need say here is that, be the explanation what it may, their behaviour, as opposed to that of healthy muscles, emphatically indicates a profound qualitative change in the mode of their reaction to these influences.

Variations in Atmospheric Pressure.—The influence of barometric pressure in exciting "rheumatic" pains has been before dealt with.

We need only here lay stress on the fact that sudden elevations or downfalls are more effectual than continued periods of high or low pressure.

Having regard to the extreme irritability of rheumatic muscles, it seems likely that the pains which ensue under such circumstances are the outcome of sudden variations in tension, to which, as we have seen, they are abnormally sensitive.

Summary.

Consideration of the foregoing sections seems to indicate plainly that rheumatic muscles are profoundly altered in respect of their reaction both to physiological and abnormal irritants, and it now remains for us to suggest reasons for this excessive irritability on their part.

As before pointed out, the underlying pathological process is an inflammatory change in the interstitial fibrous tissues—fibrositis—due probably to infective or toxic agencies.

Now, in these fibrous tissues there lie embedded the muscle spindles, as well as the peripheral sense organs of Ruffini and Golgi located in the tendons. These form part of that secondary afferent or proprioceptive system upon whose integrity Sherrington has shown the maintenance of normal muscle tonus entirely depends.

Those fibrous textures in which they are situated being inflamed, it seems reasonable to suppose that the neuro-muscular spindles, as well as the end-arborizations in the tendons, even if not actually invaded, would become hypersensitive under the influence of the contiguous morbid process.

Now, the muscle spindles, by reason of their frequent actual continuity with the general muscle substance, are at all times extremely sensitive to contraction or variations in tension in the muscle. Moreover, the organs of Ruffini and Golgi also, though not so subject to direct compression as the muscle spindles, are yet very sensitive to variations in tension following contraction of the muscular fibres related to them.

The excitability of these peripheral sense organs must, therefore, inevitably undergo great exaltation when the fibrous tissues surrounding them are the seat of an inflammatory process, as in muscular fibrositis.

Herein lies the clue to the extreme irritability of rheumatic muscle, as shown by its excessive and painful response to physiological excitants of innervation.

Again, when we recognize that the normal tone of skeletal muscles entirely depends on the integrity of this afferent system, we see at a glance that a hypersensitive state of its sensorial end-organs must of necessity lead to an augmentation of tone—in other words, *hypertonus.*

We have seen how the excessive irritability and associated hypertonus of rheumatic muscles are reflected in every sphere of the affected muscle's activity, whether exerted volitionally, passively, synergically, or otherwise.

While the foregoing remarks may serve to explain *the disorders of movement* which arise as the result of the rheumatic process, we have now to account for the development of the other objective changes characteristic of the affection.

In the acute forms of the malady, *swelling* and *heat production* are the chief objective phenomena; while in the chronic these are replaced by the formation of *infiltrations or nodules.*

Now, it cannot be doubted that these are the outcome primarily of *circulatory* disturbances, and a brief digression on this point is necessary to appreciate the part played by these factors in determining the development of fibrous formations.

In common with all other veins, those of muscles are richly provided with valves, while their walls are easily compressible.

The arteries of muscles, on the other hand, are devoid of valves, and are very slightly compressible.

In health every muscular contraction, while it has little effect on the muscular arteries, drives blood out of the muscular veins, which during the period of relaxation rapidly refill from the dilated arteries.

Thus, when a muscle during exercise undergoes rhythmic muscular contraction, the flow of lymph derived from the capillaries is greatly augmented.

As opposed to this, when a muscle is in a state of tonic contraction, a very different effect on the circulation than that produced by rhythmic contraction is brought about.

For while during such tonic spasm the arteries are dilated and blood pours in, the muscle veins throughout the same period are being steadily compressed.

Thus it comes to pass that much less blood flows from a tonically contracted muscle than one in which the normal rhythm of contraction and relaxation occurs in regular alternation.

Reviewing the objective phenomena of acute and chronic muscular fibrositis in the light of these facts, we arrive at the following conclusions:

The rheumatic muscles, as we have seen, both in the acute and chronic state, are in a condition of tonic contraction or hypertonus.

In the *acute* variety the hypertonus is of high grade but of comparatively short duration. As a result thereof the circulation through the muscle is impeded, and, becoming surcharged with blood, the muscle undergoes an increase in volume or swelling, which is temporary and subsides with the lessening of the hypertonus.

The local reaction, as shown by increased heat, is also in part attributable to the same tonic contraction of the affected muscle, for increased tension augments all the metabolic processes of muscle, including chemical changes and heat production.

Where the pathological state is very prolonged, as in the *chronic* forms, the hypertonus, though slighter in degree, is of much longer duration. This being so, the rhythmic working of the muscle pump is permanently disabled, and a state of chronic venous stasis is produced in the affected structures.

Now, when such a state of venous stagnation ensues in any organ or tissue, we know that it is only a question of time before definite changes of a proliferative nature take place in the involved structures—the so-called " congestive induration," with which we are all familiar.

In conclusion, while it may be doubted whether these circulatory disturbances are adequate of themselves to produce a condition of fibrositis, they may be reasonably regarded as strong contributory factors, and moreover, such a conception does not in any way conflict with an infective or toxic view of the origin of fibrositis.

For the primary inflammatory change in the interstitial fibrous tissues is due either to irritation by organisms *in situ* or their toxins, and in sequence to this the sensitiveness of the muscle spindles is heightened, with, as a consequence, more or less persistent spasmodic contraction or exaltation of tone.

If this be granted, it cannot be doubted that the disorders of circulation that ensue secondarily to such hypertonicity react unfavourably on the nutrition of the structures, and so, by lowering the resistance, favour the occurrence and continuance of local processes of *infection or subinfection*, while incidentally also the venous stagnation favours the overgrowth of the fibrous elements.

MUSCULAR FIBROSITIS

REGIONAL OR LOCALIZED VARIETIES

CHAPTER XIII

REGION OF THE HEAD AND NECK

Acute Muscular Torticollis.

Synonyms: Acute wry-neck; stiff-neck; caput obstipum; rheumatic torticollis.

While fibrositis may implicate any individual muscle or group of muscles within this area, it is especially prone to attack those of antero-lateral or retrocollic distribution.

The condition thus produced passes under the familiar appellation of "stiff-neck" or "rheumatic torticollis," which from time immemorial has been regarded as one of the principal manifestations of muscular rheumatism.

Definition.—A painful idiopathic rigidity of one or more muscles of the neck, commonly of unilateral distribution, in which the head is obliquely twisted with occiput towards affected and face towards sound side. If of bilateral distribution, the head is fixed immovably between the shoulders.

Etiology.

It displays no pronounced partiality for either sex, but is more common in adolescents and young children than any other variety of muscular fibrositis.

Though unknown in infancy, it occurs so frequently in children that it may be said to be the analogue in them of the lumbago of adults.

Persons who inherit the rheumatic or gouty constitution are well known to be especially liable to such attacks. Sufferers from torticollis in childhood, in middle life they are very likely to be troubled with lumbago.

The special influence of draughts in exciting this particular form has been dealt with in the general etiology, where it was pointed out that the anatomical peculiarities of this region in some way seem to favour its effective action.

Clinical Account.

Both acute and chronic varieties of torticollis can be distinguished, but the former is by far the most common, and calls for attention in the first instance.

The usual account given is that the subject, without any preceding consciousness of indisposition, wakes from sleep with a so-called "crick" in the neck. In children it will be noticed that they are often of anæmic cast, and, without being definitely ill, have often been out of sorts.

In most instances a history of exposure to cold or draught is forthcoming, but from personal experience as well as observation we feel sure that sleeping in a cramped or awkward position is also a contributory factor.

So transient and mild is the affection that it can hardly be regarded as anything more than a fleeting, though very annoying, discomfort, the symptoms of which may, indeed, entirely disappear within a few hours.

In its more severe forms, however, it may, like the allied affection lumbago, be exquisitely painful, and, as far as the particular muscles are concerned, disabling in its intensity.

Judging from actual experience of both disorders, we would describe the pain of torticollis as being much the same as that typical of lumbago, and, like it, induced or aggravated by motion.

In mild cases movement of the affected muscles is possible, though pain and stiffness accompany it; but in very acute forms the slightest exercise of even remote parts occasions intense suffering, the apprehension of which gives to the patient, especially if a child, a very characteristic strained and timid aspect. Thus, if asked to turn his head, he instinctively compromises, and instead rotates his whole body.

In such acute cases there is often some degree of general fibrositis. Thus, for example, in one recently under our care, the subject, in addition to his "stiff-neck," had well-marked fibrositis of the knee-joints.

Constitutional Symptoms.—The body temperature is often raised to 100° or 101° F., and with this there is associated frequently some gastric derangement, or a catarrhal state of the fauces or upper respiratory passages.

The toxic nature of the disorder is further betokened by fleeting neuralgic pains due to irritation of the nerve sheaths, whence the faceache so commonly complained of by these patients.

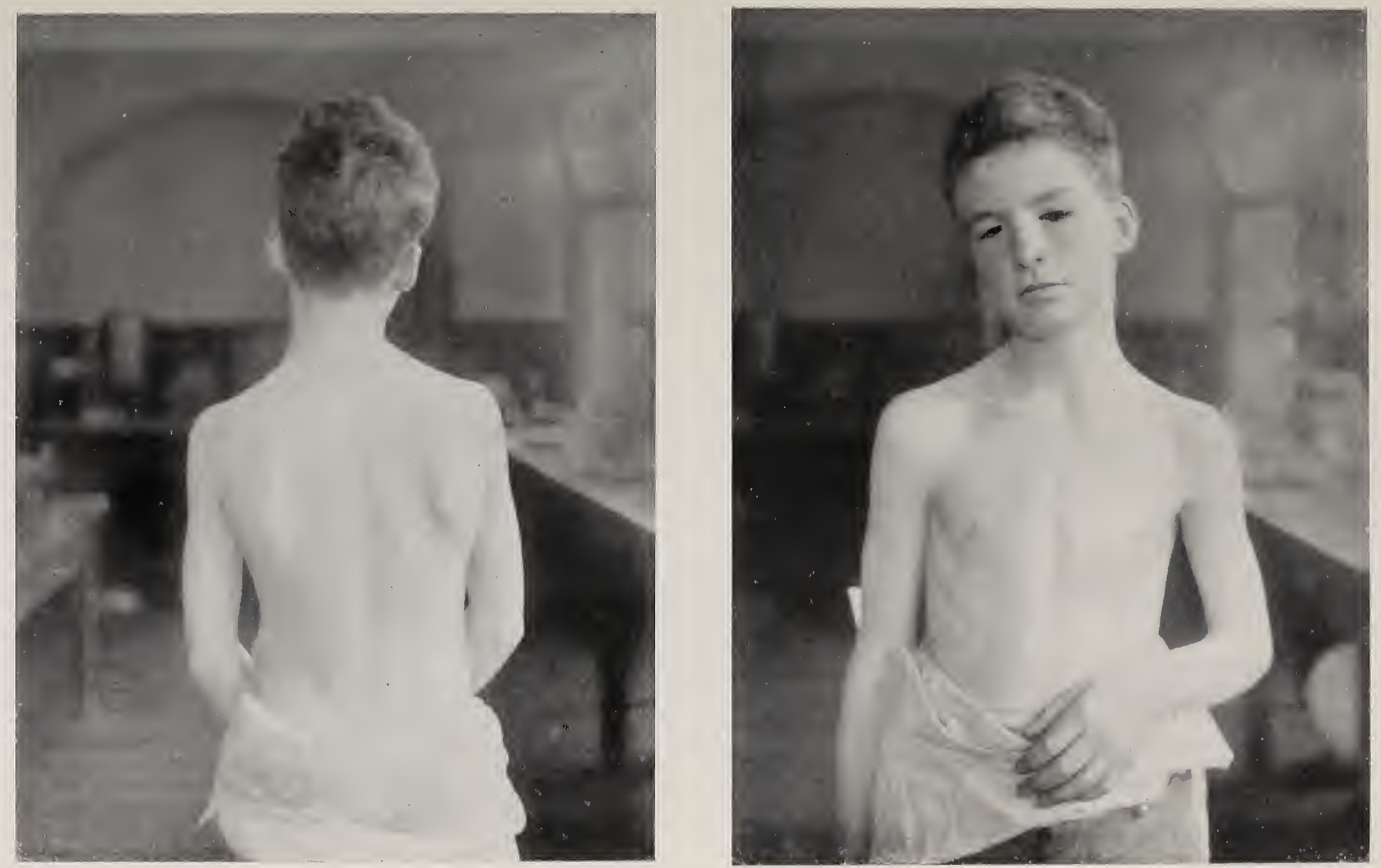


FIG. 29.—Acute rheumatic muscular torticollis. Clavicular bundle of trapezius on right side chiefly affected. Note lateral inclination of head to affected side with chin deviating to opposite side. The two photographs are taken from the same case.

To face page 202.

Objective Phenomena.

Notwithstanding the comparatively transient nature of the affection, careful palpation of the affected muscles will reveal the presence of small areas which are exquisitely sensitive to pressure.

The centre of such foci is usually softer than the peripheral portions, which are more resistant in consistency, and when closely aggregated may give rise to a considerable degree of localized swelling.

The morbid process as a rule does not proceed beyond the stage of serous exudation, and the effused products readily undergo absorption.

Organized infiltrations or nodules are usually not appreciable, save in the wake of recurring attacks, or in those rare instances in which the condition persists in a more or less chronic form.

Vicious Attitudes.—As before stated, in the majority of instances torticollis is of unilateral distribution. The resulting deformity is very usually attributed to a "rheumatic" inflammation of one or other sterno-mastoid muscle, the contention being that in order to relax the part and so lessen the pain the neck is held with peculiar stiffness and inclined to the affected side.

But in our experience in rheumatic torticollis it is not the sterno-mastoid, but the trapezius, which is most commonly at fault, more particularly its clavicular portion. The trapezii on both sides may be involved, but in the majority of instances the affection is non-symmetrical.

When the disorder is unilateral, the sterno-mastoid, scaleni, and other muscles on the same side, in order to insure rest for the inflamed trapezius, pass through a stage, as it were, of "vigilant" contraction, inclining the head to the painful side to a greater or less extent according to the severity of the attack.

It is easy clinically to satisfy oneself of the truth of this contention, for if an endeavour be made to correct the lateral inclination and restore the head to its ordinary position extreme distress results.

The suffering produced is not situated in the sterno-mastoid and scaleni muscles, but in the *lateral or clavicular portion of the trapezius*, which is thereby placed in a state of painful extension.

It is extremely tender to the touch, and can be felt running like a tense cord under the skin, the muscular fasciculus being in a state of hypertonic contraction.

If the muscle be palpated, its tenseness is temporarily increased through the induced secondary contraction, which immediately ensues on handling. The opposite and unaffected muscle contrasts in all these respects, being soft, lacking in tenderness and tension, and shows no resentment of palpation.

To return to our point, if instead of attempting to correct the lateral list of the head, which, as before seen, is extremely painful, we, on the other hand, press it still farther in the direction of the affected side, no pain will ensue in the inflamed trapezius.

At the same time the contracted sterno-mastoid and scaleni muscles will experience distinct relief through being released, at any rate temporarily, from the necessity of protecting the disabled trapezius from undue extension.

After the same fashion, if the affection of the trapezius be bilateral, the deep extensors of the cervical spine come to the rescue, and by drawing the head backwards prevent extension of the inflamed trapezii.

If in such a case the head be pressed forward, great pain will result; while if its backward inclination be slightly exaggerated, no increase of pain, but rather a feeling of relief, will ensue.

Course of Disease.—The acute phase of the disorder rarely exceeds three or four days in duration, the symptoms afterwards gradually subsiding.

A marked tendency to relapses or recurrences, however, characterizes this as all other forms of muscular fibrositis.

Continued or reckless exposure to the exciting causes may determine a series of attacks, and thus this usually fleeting affection may be prolonged indefinitely. Indeed, it is probable that its ephemeral character is more apparent than real, as the subsequent extreme sensitiveness of the muscle to draughts and so forth seem to indicate unmistakably that a *restitutio ad integrum* of the affected parts does not take place until some time after the subjective symptoms have subsided.

Complications.—During the actual progress of the disease Leube, Adler, and others have observed *endocardial* complications develop, and this even in mild examples of stiff-neck.

The affection, too, may occasionally pass without break into a genuine attack of *acute articular rheumatism.*

In obstinate cases a condition of spasmodic wry-neck has in rare instances supervened, but more commonly, in the wake of repeated attacks, *fibrous nodules* form in the affected muscles or their sheaths, and a condition of chronic fibrositis of the cervical muscles ensues.

Acute Articular Torticollis.

Up to the present our consideration has been devoted to those forms of torticollis attributable to a rheumatic inflammation of the muscles.

It now remains for us to consider those rarer instances in which the phenomena presented seem to suggest that the morbid process is located, not in the muscles, but primarily or predominantly in the cervical articulations on one or both sides.

The *clinical features* met with in such articular types of torticollis are as follows:

The condition arises in the same abrupt fashion in sequence to a chill or some other exciting cause.

The site of spontaneous pain is not in the muscles, but is situate posteriorly over the apophyseal articulations on one or other side. On inspection the head and neck, instead of being inclined to the affected side, as in muscular torticollis, have a list to the opposite and healthy side.

Thus, when the left articular apophyses are involved in this form of stiff-neck, the head is bent to the right and the face turned to the left with slight flexion. The spinal column, therefore, presents an obvious curve whose convexity is to the left, and the most salient portion of which is occupied by the segments chiefly implicated by the morbid process.

In addition there develops a temporary compensatory curve in the opposite direction of the dorso-lumbar column.

On closer examination, the only muscles that will be found contracted will be the sterno-mastoid and the upper portion of the trapezius on the diseased side, but these muscles are not tender on palpation, nor are they apparently in a state of hypertonus.

If an attempt be made to forcibly incline the head to the left, intense distress will be occasioned.

In explanation of the nature of the deviation, we would suggest that, owing to the inflamed state of the articulations, the inclination of the head to the healthy side insures the maximum degree of separation between the articular surfaces, and incidentally is the attitude entailing the minimum of pain.

The contraction of the sterno-mastoid and trapezius on the affected side is, we believe, of purely compensatory nature, largely intended to counterbalance the action of gravity, inasmuch as the head in these cases is perforce in a state of unstable equilibrium.

The *course* pursued by this presumed articular type in no way differs from that characteristic of the muscular variety, and is of equally brief duration.

Acute Torticollis.

General Diagnosis.

The condition of "stiff-neck" is symptomatic of many disorders, and though the recognition of its presence is comparatively easy, the estimation of its cause can only safely be arrived at by the process of exclusion.

In the first place, it is certainly unwise to arrive straight off at the conclusion that the condition is merely a *rheumatic* manifestation.

The history of the case should be carefully taken, its mode of onset, whether sudden or gradual, noted, and also the duration.

If *abrupt*, it may have been due to a blow, a sudden strain, or a fall. While severe injuries are almost always quickly fatal, one must bear in mind that even unilateral dislocation of one of the cervical vertebræ is not necessarily so, and the resulting pain, stiffness, and deformity may closely simulate "stiff-neck," for which it has indeed been mistaken (Tubby).

If of *gradual* development, we should in the first place endeavour to exclude all forms of so-called "reflex" torticollis.

If of *prolonged* duration, the deviation may be a remote consequence of *astigmatism*, while of course congenital and spasmodic types of torticollis must be held in mind.

The temperature of the patient, generally a child, should always be taken, and any signs of acute illness noted. For it must not be forgotten that pain and stiffness in the neck in children are often symptomatic of grave disorders, such as *purulent otitis media*, *meningitis*, or even *tetanus*.

It is important, also, to ascertain if the child has recently suffered from any *infectious* disorder, for a cervical arthritis sometimes follows scarlet fever, diphtheria, or tonsillitis.

In any given case of "stiff-neck" with pyrexia in a child, accompanied by signs of acute illness, we should refrain from premature or too dogmatic assertions as to the nature of the illness.

Lastly, in all cases it is imperative that the patient should be examined with the back bare of all clothing, and every effort made as far as possible to locate the exact site of the morbid process; otherwise one is almost certain sooner or later to fall into one of the numerous pitfalls that beset the diagnosis.

We shall now proceed to indicate briefly the salient points of acute torticollis of muscular origin.

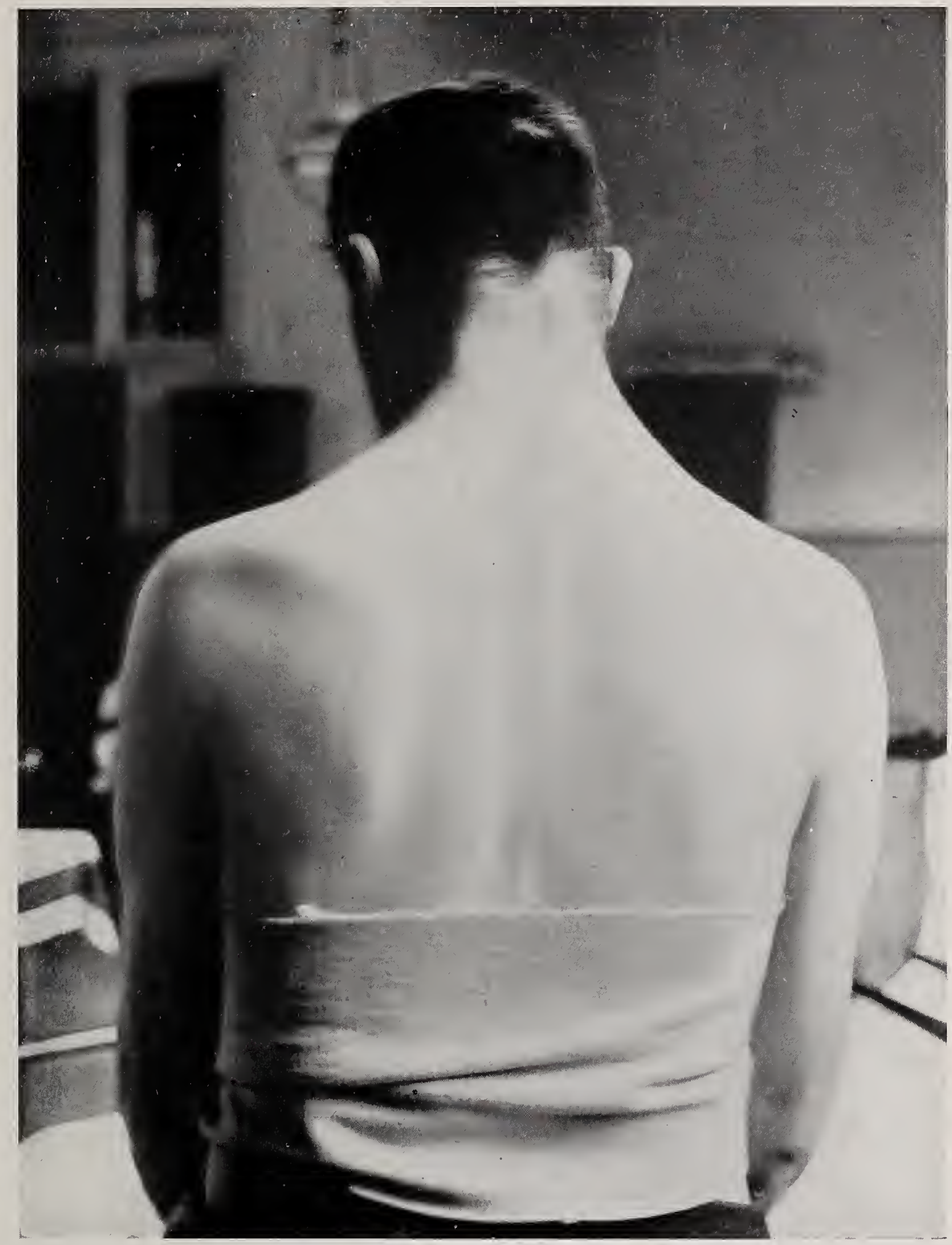


FIG. 30.—Chronic cervical fibrositis, implicating not only the muscles, but the fascial layers of the nuchal region, with resultant marked thickening of the structures in this region. Note that head is fixed in a position of downward and forward flexion with rotation to the left side.

Acute Muscular Torticollis.

Age and Sex Incidence.—The affection is most frequent in children, and in regard of adults, according to Tubby, more common in females.

Etiology.—History of exposure to draught.

Onset.—Abrupt.

Symptoms.—Pain with stiffness on one or other side of the neck is present, which is aggravated by rotatory or nodding movements.

Local Signs.—Lateral inclination of head to *affected* side, with chin deviating to opposite side, is found.

Attempts to restore the head to its normal position are extremely painful, but exaggeration of its inclination to the affected side is painless.

Undue tenseness, chiefly in the clavicular portion of the trapezius or sterno-mastoid muscles, is recognizable, with single or multiple areas of tenderness on palpation.

Acute Articular Torticollis.

This contrasts with the muscular type in that the head has a list to the *healthy* side.

Site of Pain.—Varies according to whether right or left cervical joints are involved. Thus, in right-sided cervical arthritis the spinal column in this region will show a convexity to the right. Spontaneous pain as well as tenderness are only experienced over convex side of neck. Tender points are located over the transverse or spinous processes of upper four cervical vertebræ.

As opposed to the muscular type, the muscles on the concave side of curvature are neither painful nor contracted. The muscles of convex side, again, though firmly contracted to counteract the effect of gravity, are not painful.

Exaggeration of lateral flexion is painless, but replacement of the head towards the convex side elicits suffering.

Duration.—This in both muscular and articular types of acute "rheumatic" torticollis does not in the majority of instances exceed three or four days.

Differential Diagnosis.

Reflex Torticollis.—The causes of this type are multiple. Among the more common are cervical adenitis, cellulitis, tonsillitis, etc. Signs of swelling and inflammation will be obvious, and there is an absence of spasm or rigidity in the muscles.

The neck is not in reality stiff, but is held stiffly because movement is painful.

Trauma.—Stiff-neck sometimes results from a blow or some awkward, unintentional movement, and very rarely unilateral dislocation of one of the cervical vertebræ follows injury, and, being not necessarily fatal, may prove a source of error.

In the latter event the absolute immobility of the deviated head after an injury is suggestive. As in acute articular torticollis, the head is inclined to the uninjured side, but with this is associated some *irregularity of the spinous processes*, and likewise symptoms pointing to compression of the related nerve roots—viz., *paresis* and *radiating pains.* In any case of doubt skiagraphy should clear up the nature of the affection.

Infective Arthritis of Cervical Vertebræ.—This is in children a very common form of suppurative arthritis, going on sometimes to complete ankylosis; it occasionally follows *scarlet fever, diphtheria, or tonsillitis.*

The presence of œdema and thickening, deviation with absolute immobility of the affected part of the column—all arising in sequence to some recent illness of infective type—will plainly indicate the more serious nature of the affection.

Cervical Caries.—The possibility of tuberculous disease should never be overlooked, for pain and rigidity are among the earlier signs; hence the frequency with which caries of this region is erroneously dismissed as a mere " stiff-neck."

It occurs most commonly in young adolescents or children, who, apprehensive of the pain that follows movement, often hold the head in their hands in a very stiff and bolt-upright manner.

Pain radiates over the area of suboccipital and other cervical nerves, while tenderness is present over the spinous processes.

Only in later stages does any lateral or angular curvature develop. If the possibility of tubercle be borne in mind, error is not likely to occur; but in case of doubt skiagraphy should be resorted to.

Burns.—Stiffness and deformity due to cicatricial contraction are easily recognized at sight.

Congenital Torticollis.—This usually dates from birth, affects as a rule the right sterno-mastoid muscle, and is often accompanied by facial asymmetry and marked lateral curvature in old cases.

Spasmodic Torticollis.—The clonic spasms of the sterno-mastoid and other muscles coming on suddenly with severe pain, and followed by relaxation, can hardly be misunderstood.

Chronic Cervical Fibrositis.

The symptoms produced are somewhat varied, and will be more conveniently considered under two headings: (1) Chronic torticollis; (2) cephalalgia rheumatica, or epicranial rheumatism.

Chronic Torticollis.

Etiology.—In instances, fortunately rare, the condition of "stiff-neck" assumes a more or less permanent character. While it may be due to the persistence in an inveterate form of an acute torticollis, it more frequently arises after a latent or insidious fashion.

Anatomical Changes.—The fibrous hyperplasia in these cases is very widely diffused, implicating not only the muscles, but also the fascial layers of the nuchal region, and extending even to the fibrous capsules of the intervertebral articulations.

Commonly the skin and subcutaneous tissues are involved, and ultimately the progressive induration of the various structures culminates in the formation of a mass of tissue of cicatricial hardness, situated in the nuchal region of one or both sides.

Not only the trapezii, but also the splenius capitis and the deeper muscles participate, and not uncommonly the cranial aponeuroses and periosteum are similarly invaded.

Naturally, the maturation of these chronic muscular inflammations in the cervical as in other regions is an extremely gradual process, covering a period of not only months, but often years.

Clinical Account.

Pain, aching, and stiffness in the affected cervical muscles are the salient features, and with these are associated more or less impairment of their functional efficiency.

As in the acute forms, the symptoms are aggravated by movement or any increase of tension in the implicated structures, which, moreover, pass into a state of painful fatigue under the slightest strain.

In short, we get a reproduction, though in a minor key, of the acute variety of "stiff-neck," of which, indeed, it may be an extension.

Usually the *onset* is extremely indefinite, but in any case we get more or less continuous pain and disability, which from time to time undergo exacerbations.

The *symptoms* will vary according to the site of the morbid process. Where the inflammatory change is fixed in some circumscribed area, either in the belly of the muscle or near its insertion, the pain will be strictly localized to the same site. It will be aggravated by the particular movements subserved by the affected muscle, while the actual infiltrated areas will be sensitive to pressure.

This strict localization of the pain is invariable, save when the induration impinges on a nerve trunk, when it is referred along its course.

As a rule, in fibrositis of the nuchal muscles the pain radiates into the head, but occasionally it passes down the arm, and the symptoms of brachialgia are superadded.

Objective Phenomena.—The affected muscle or muscles, when palpated, are found to be unduly hard in consistence and the seat of nodules or more diffuse infiltrations in their fleshy bellies or tendinous attachments.

The presence of such deposits in the retrocollic and anterolateral muscles is readily ascertainable save during the progress of an acute exacerbation. In such event all that is possible to be made out may be a longitudinal swelling lying over the muscles situate in the groove between the transverse and spinal processes of the cervical vertebræ. The impossiblity or difficulty of distinguishing the individual muscles is presumably due to their swollen condition distending or rendering extremely tense the overlying nuchal fascia.

In the intervals of exacerbations in these chronic cases nodules may be detected in the sterno-mastoid and other muscles. In the former their preferential site is in the sternal head, and nearly always at its juncture with the clavicular portion.

Other favourite sites for the localization of the nodules are in the trapezius, splenius, and scaleni muscles, particularly near their cranial insertions.

In other instances the nodules are situate in the fascial layers, and thickened strands are sometimes to be felt running down between the sterno-mastoid and transverse processes of the middle cervical vertebræ.

Course and Remote Effects.—During the oft-recurring exacerbations which characterize the disorder, the subjects instinctively adopt the least painless pose.

Gradually, with the progressive thickening that follows repeated attacks, the vicious attitude at first assumed for the relief of pain becomes fixed immutably.

Thus, in the more inveterate examples the head undergoes rotation and more or less lateral deviation. In those instances complicated by brachialgia, Norstrom has noted that other vicious attitudes may result from the constant effort made to relax the painful muscles, and so to lessen pain.

Fortunately, these malign forms are not common, but all betray the same pronounced tendency to chronicity.

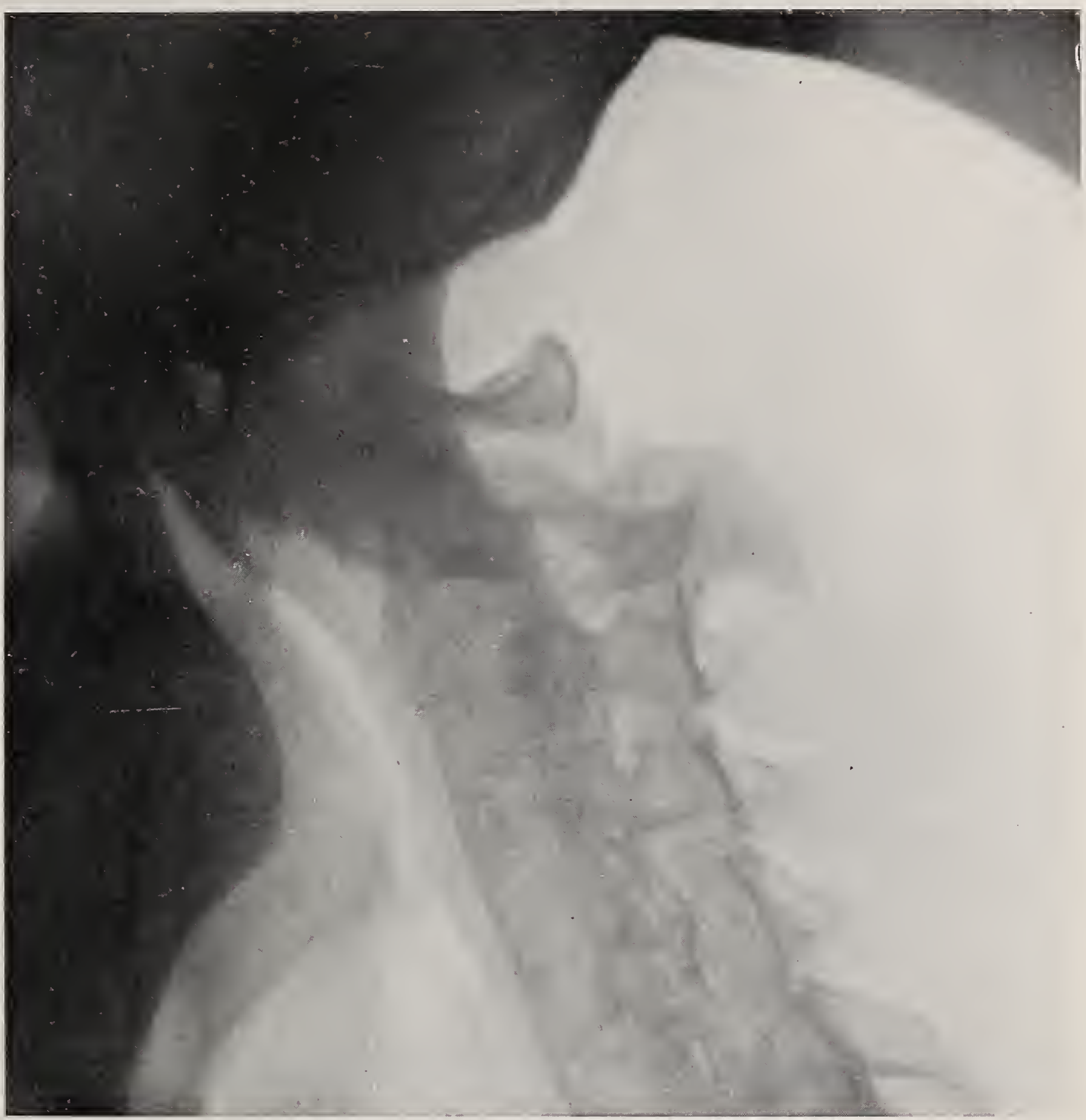


Fig. 31.—Skiagram of case of spondylitis deformans. The plate shows the resulting fusion of the bodies of cervical vertebræ.

To face page 210.

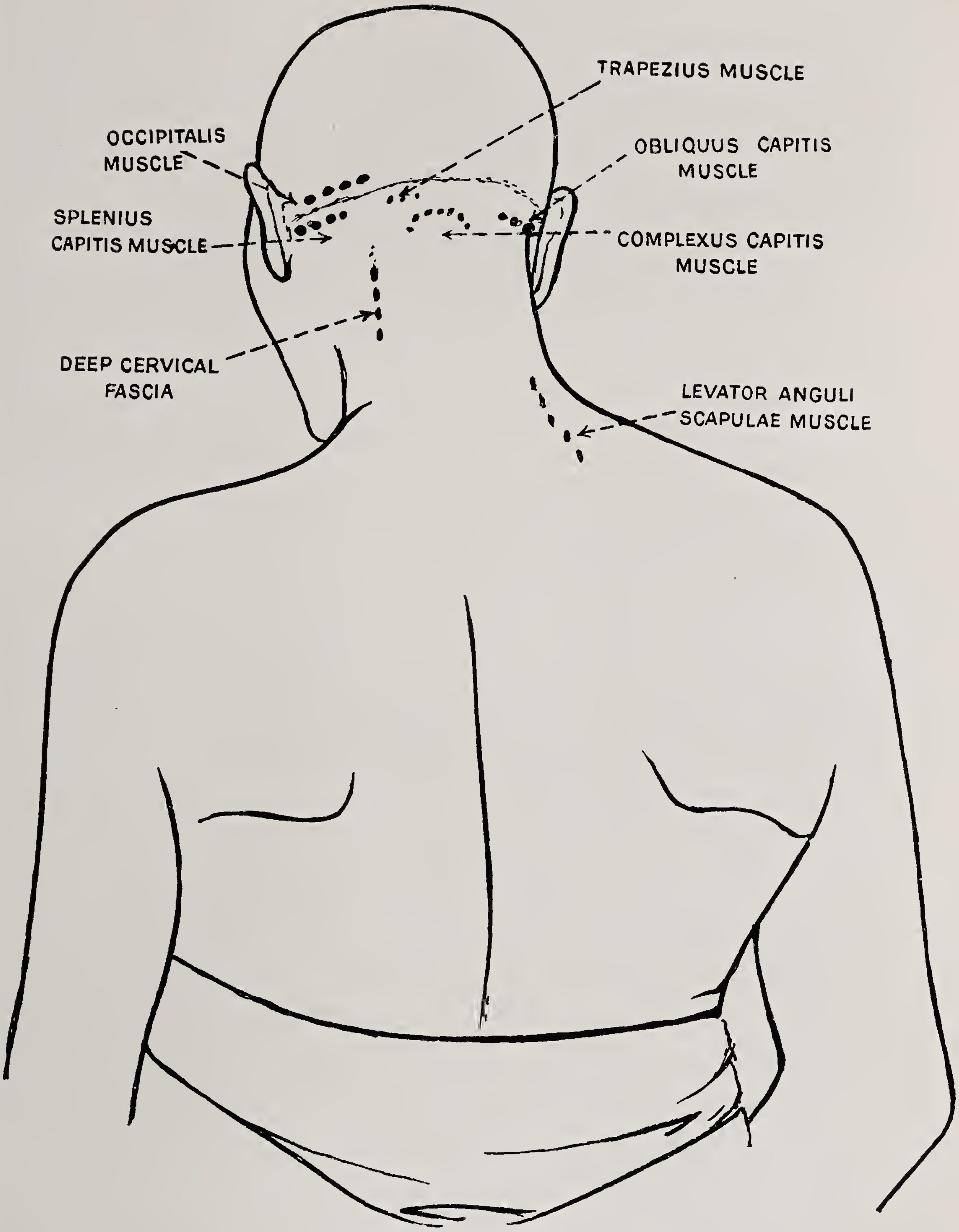


Fig. 32.—The above diagram shows the sites at which nodules are most commonly found in chronic cervical fibrositis and cephalalgia rheumatism.

To face page 210.

Diagnosis.

The condition is usually met with in adults, and develops after an insidious or latent fashion. The subjects usually give a history of having suffered from other forms of localized fibrositis. In early stages the affected muscles are swollen, spasmodically contracted, with areas of tenderness.

In advanced cases visible and palpable thickening of focal or diffuse nature is to be found in the muscles near their cranial or vertebral attachments. The mobility of the column is restricted to a variable extent, and accompanied frequently by creaking due to implication of the periarticular structures.

Deformity, if present, takes the form of lateral deviation of the head, with rotation of the face to one or other side.

In simple chronic torticollis skiagraphy shows no change in the bony and cartilaginous tissues.

Differential Diagnosis.

Rheumatoid or Atrophic Spondylitis.—In women within the child-bearing period it occasionally happens that the first symptoms of rheumatoid trouble may somewhat closely simulate an attack of "stiff-neck."

Such cases are usually preceded by severe neuralgic pains radiating into the cervical and occipital regions.

The similarity to rheumatic "stiff-neck" is increased by the fact that these attacks of pain and stiffness are frequently fleeting in duration, and commonly excited by draughts and exposure.

Each attack, however, leaves the patient with a gradually increasing restriction of the range of movement of the cervical spine.

Differentiation in early stages is by no means easy, but recurring attacks of stiff-neck in a woman recently confined are extremely suspicious.

Cramps in the hand, also attacks of local syncope or asphyxia, all point strongly to the possibility of rheumatoid disease, and not to "rheumatism." Involvement of the temporo-maxillary articulation, even temporarily, during an attack is suggestive, and any tendency to periarticular swellings in the fingers is proof positive of its rheumatoid nature.

Osteo-Arthritic or Hypertrophic Spondylitis.—In middle-aged persons this affection sometimes makes its primary appearance in the cervical articulations, and commonly gives rise to more or less constant stiffness, intensified from time to time by pain radiating to the head or arm.

It may be simulated very closely by chronic myositis of the posterior cervical muscles, inasmuch as it is often accompanied by a general fibrositis of the nuchal structures on one or other side, giving rise to cicatricial hardness in this region.

If, as often happens, there occur radiating cervical, occipital, or brachial pains, the result of pressure from nodules or direct implication of the nerve sheaths, the diagnosis may be distinctly difficult. In this as in the former variety of spondylitis, an appeal to *skiagraphy* should always be made to clinch the diagnosis.

Cephalalgia Rheumatica.

This epicranial form of rheumatism was well recognized by Chomel and the older physicians, who regarded it as one of the principal varieties of "chronic rheumatism."

Strictly speaking, any division between it and torticollis is to a large extent arbitrary, as the difference in their symptomatology is determined merely by the site, and not by any variation in the nature of the morbid process.

The salient distinction is that in chronic torticollis the condition partakes more of a myalgia, using that term as indicating a painful muscle.

As opposed to this, in cephalalgia the affection is more of a neuralgiform character, this being due to the impinging of a deposit on some contiguous nerve trunk.

Inasmuch as the character of the symptomatology varies according to the location of the fibrous lesions, it will be convenient here to indicate their more common sites.

Site of Nodules.—They may be situated in the retrocollic or antero-lateral muscles, which during acute phases will be found swollen with areas of tenderness, while they are the seat of considerable spasm or hypertonus.

At a later stage nodules and infiltrations make their appearance, whence the term "indurative headaches." Similar indurations are sometimes to be detected in the occipital and small cervical muscles near their attachment to the transverse processes.

Or they may be found near the point of emergence of the occipital nerve, or in the posterior part of the cranial aponeuroses near the lambdoid suture, at which site a group of nodules sometimes develops.

It may be remarked that fibrous formations of ephemeral nature have been observed to arise in these same areas in the course of acute articular rheumatism.

Whether situated on the scalp or in the nuchal muscles, the indurations are always tender to the touch. In the former

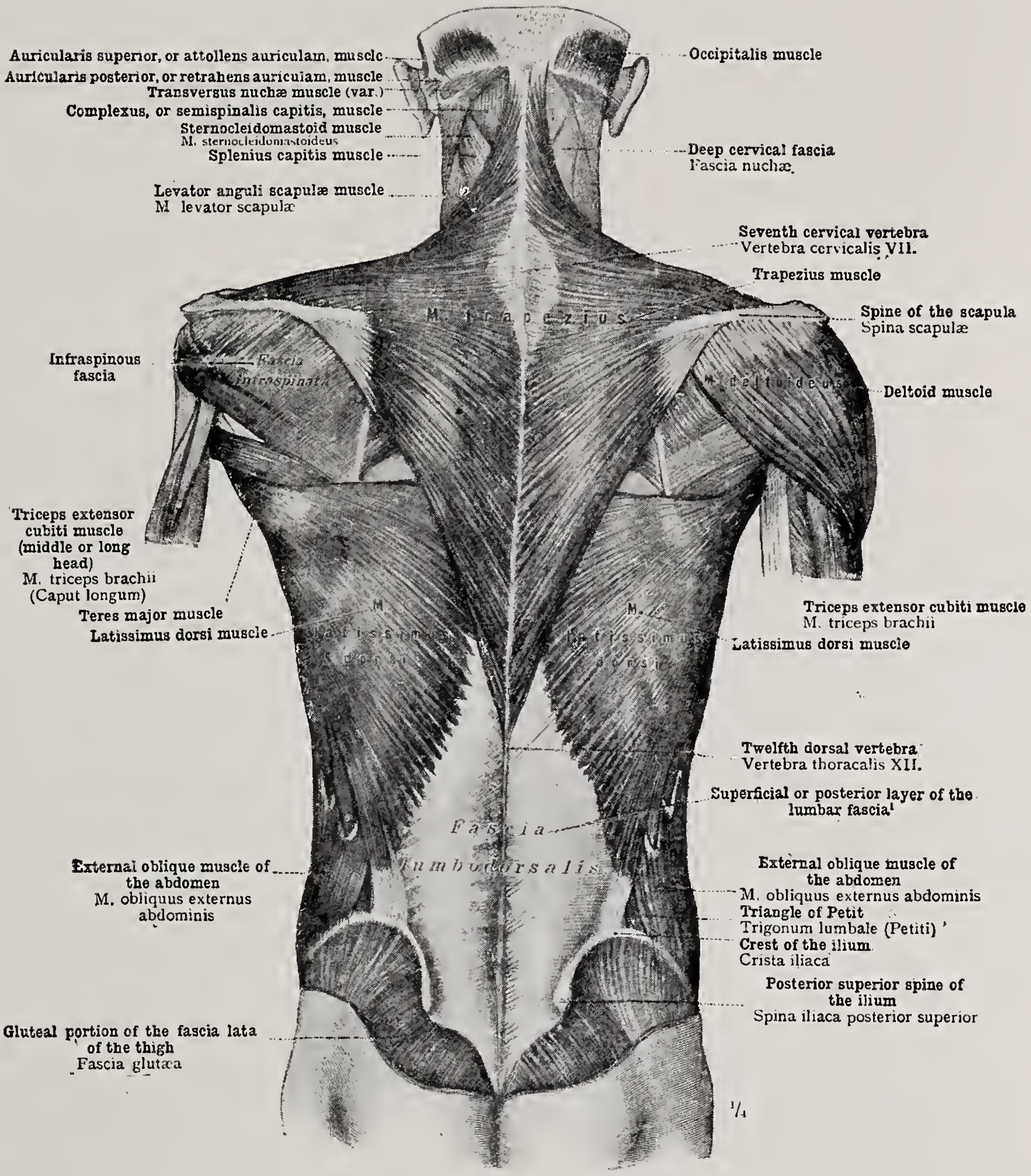

Auricularis superior, or attollens auriculam, muscle
Auricularis posterior, or retrahens auriculam, muscle
Transversus nuchæ muscle (var.)
Complexus, or semispinalis capitis, muscle
Sternocleidomastoid muscle
M. sternocleidomastoideus
Splenius capitis muscle
Levator anguli scapulæ muscle
M levator scapulæ
Occipitalis muscle
Deep cervical fascia
Fascia nuchæ
Seventh cervical vertebra
Vertebra cervicalis VII.
Trapezius muscle
M. trapezius
Spine of the scapula
Spina scapulæ
Infraspinous fascia
Fascia infraspinata
M. deltoideus
Deltoid muscle
Triceps extensor cubiti muscle (middle or long head)
M. triceps brachii (Caput longum)
Teres major muscle
Latissimus dorsi muscle
M. latissimus dorsi
M. latissimus dorsi
Triceps extensor cubiti muscle
M. triceps brachii
Latissimus dorsi muscle
Twelfth dorsal vertebra
Vertebra thoracalis XII.
Superficial or posterior layer of the lumbar fascia[1]
Fascia lumbodorsalis
External oblique muscle of the abdomen
M. obliquus externus abdominis
External oblique muscle of the abdomen
M. obliquus externus abdominis
Triangle of Petit
Trigonum lumbale (Petiti)
Crest of the ilium
Crista iliaca
Posterior superior spine of the ilium
Spina iliaca posterior superior
Gluteal portion of the fascia lata of the thigh
Fascia glutæa
1/4

FIG. 33.—The muscles of the neck and back being especially liable to fibrositis, this plate has been here inserted to show the anatomical disposition of the muscles most commonly affected in acute and chronic torticollis. It will also be found convenient for the reader to refer to when perusing the subsequent sections dealing with the muscles and fasciæ involved in dorsodynia and lumbago respectively. (Toldt's Atlas.)

To face page 212.

locality the nodules are sometimes freely movable on the subjacent cranium, but when attached to the periosteum they are not so.

Lastly, it may be noted that the cervical glands are often enlarged and easily palpable.

Clinical Account.

The picture presented under such circumstances is naturally very diverse, and may simulate hemicrania or migraine, or cervico-occipital neuralgia, while in some cases brachialgia may also be present.

At first the condition consists in isolated attacks of headache or neuralgia, with intervening periods of freedom.

But in the presence of deposits the tendency to recurrence is inveterate, and ultimately the patient is hardly ever free from pain or discomfort.

The so-called " headache " is superficial and not deep-seated, and may be dull or aching or definitely neuralgic. It may radiate upwards over the whole scalp, and through the associated spasm of the cervical muscles the head and neck are held in a state of painful rigidity.

When the fibrous lesions are in the epicranial structures, the headache may be limited to the occipital region, more especially to the vicinity of the mastoid processes. More rarely it is referred to the frontal or temporal area or to the course of the trigeminal nerve.

When situated in the epicranium, it is aggravated by movements of the occipito-frontalis, but if located in the cervical muscles nodding or rotation of the head causes more distress.

But whatever the site, the most certain manner in which an aggravation of the suffering can be induced is by direct pressure on the nodules.

In some instances the headaches are distinctly hemicranial, and they may take the form of an intense and long-standing trifacial neuralgia.

Yawger has related an interesting example of this nature in which the severity of the distress led a neurologist to suggest the immediate removal of the Gasserian ganglion.

The neuralgic pains were found to be due to indurations in the supra-orbital region, the scalp, the trapezius, and other cervical muscles, local treatment of which by massage was followed by most marked amelioration.

Some have noted that in these headaches the pain is increased by ocular movements, while the conjunctivæ are injected.

These subjects are unusually susceptible to draughts or exposure to damp. Railway travelling, and in recent years motoring, are frequent causes of relapses or exacerbations.

When of long standing considerable mental and physical depression result, so much so, indeed, as to reduce the subject to a state of chronic invalidism.

It is sometimes stated that the impugned nodules are merely coincident and not causal, but pressure on the deposits often suffices to initiate an attack precisely similar to that previously experienced by the patient.

Moreover, since following their dispersal by massage the headaches permanently disappear, it seems difficult to deny their relationship. We have known intractable headaches of years' duration vanish after successful treatment of indurations in the upper portion of the trapezius.

Norstrom, Adler, Yawger, Telling, and others have emphasized the fact that myositic deposits are common, but too rarely recognized, causes of obscure headache.

Though these cephalalgias may be an epiphenomenon of chronic torticollis, it is by no means always the case, for frequently they occur in patients who have never suffered from "stiff-neck." But at the same time a history is usually forthcoming of the previous attacks of localized fibrositis in other regions.

Juventin, reflecting on the cause of these headaches, has suggested that, in cases with extensive deposits in the neck, it is possible that these by compression of the cervical vessels may give rise to cerebral congestion.

But this hypothesis is obviously capable of very limited application, as in the majority of instances the deposits are far too circumscribed to exercise any such untoward effects on the vascular current.

In conclusion, the importance of these so-called "indurative" headaches lies in the fact that their true cause but too often passes undetected.

The sad plight to which these sufferers are ultimately reduced impels one to emphasize the paramount necessity for careful and repeated palpation of the cervical muscles and cranial aponeuroses in all subjects of obscure or long-standing headache or neuralgia.

Diagnosis.

The diagnosis of this condition should always be arrived at by a careful process of exclusion.

We should in the first place eliminate all headaches due to *errors of refraction*, also those resulting from diseases of the *nasal and accessory sinuses*, the epicranium or cranial bones.

In regard to this last cause of headache, we should be especially alive to *syphilitic* affections of the periosteum or bone, as we have known such cases sometimes find their way to spas under the diagnosis of " rheumatic headaches."

The headaches associated with *high arterial tension* and those due to *gross intracranial disease* should also be kept in mind.

If after examination all these various sources of headache can be put out of court, we shall then be justified in entertaining the possibility that it may be an example of so-called " indurative headache."

But to establish such a diagnosis it is essential that we be able by palpation to localize *myositic deposits*, either in the cervical muscles or aponeuroses, or, failing this, in the epicranial structures; while as collateral evidence, a previous history of localized fibrositis elsewhere will be of the greatest value.

CHAPTER XIV

REGION OF UPPER EXTREMITY

Brachial Fibrositis.

Synonyms : Omodynia rheumatica; deltoid rheumatism.

THE symptomatology of brachial fibrositis is most diverse, varying of course according to the site and intensity of the morbid process.

In most instances the mischief is limited to the fibro-muscular tissues, while occasionally the joints and nerve sheaths are coincidently or secondarily implicated, but happily this diffuse involvement of the fibrous textures is rare.

Sometimes, too, the bursæ in relation to the shoulder-joint—the subacromial sac especially—are implicated by extension.

In intensity, also, the affection betrays wide variations, the acute forms merging with imperceptible gradations into the subacute or chronic varieties. Still—without being too arbitrary—we may for convenience of narration consider the symptomatology under two headings: (1) Acute brachial fibrositis; (2) chronic brachial fibrositis.

Acute Brachial Fibrositis.

Etiology.—Its subjects are usually middle-aged or elderly, but occasionally young adults and even children are attacked.

Of predisposing causes a gouty inheritance is the most potent, and the constancy with which this ancestral taint figures in the life-history is most remarkable. As Gowers rightly states, some of the most severe cases occur in "elderly ladies of blameless habits, and elderly abstemious clergymen—members of conspicuous gouty families—who have inherited the tendency to gout, but have not merited its development."

Apart from such inherited tendencies, however, one meets with instances in which the victims themselves have suffered from classical attacks of arthritic gout.

Of determining factors the most important is certainly "chill," and it is possible that the intimate adherence of the deltoid to the skin and other superimposed structures accounts for its sensitiveness to sudden variations in surface temperature.

Indeed, once established, in no variety of fibrositis is the response to meteorological variations swifter or more certain than in this brachial type. So infallibly, indeed, do they pay the penalty for carelessness in this respect that the sufferers, but too often of neuropathic cast, literally become obsessed by their fear of draughts, damp, and so forth.

Clinical Account.

The first intimation of pain and stiffness in the arm, usually the shoulder, is very commonly experienced after a night's rest. The explanation doubtless is, the subject during his slumbers turns over in bed and unwittingly uncovers his shoulder. The parts are probably bedewed with sweat owing to the snug warmth of the pillow in which they have lain embedded, and being unconsciously exposed, perhaps for hours, chilling of the skin surface ensues.

Any muscle or group of muscles may be selected, but the scapulo-humeral, and more especially the deltoid, are those around which the chief clinical characteristics of acute muscular rheumatism in the upper limb tend to centre themselves.

It is, indeed, in the shoulder muscles that the mischief first begins, and so we shall, in the first instance, proceed to describe the features of so-called *deltoid rheumatism.*

The disorder is usually *unilateral,* though we have seen it symmetrical, but even here the pain is usually more severe on one side.

In the initial stages the patient may be conscious of nothing beyond a feeling of aching and stiffness when the deltoid is brought into action; in short, elevation of the arm to the horizontal position is possible, though painful. At this period, if the needful rest be obtained, the attack may be abortive.

Unhappily, but too often, either through inability or disinclination, this course is not adopted. So day by day the pain and disability increase until the condition enters at last upon its acute phase.

The pain now becomes too intense to admit of the direct raising of the shoulder by the inflamed muscle. Consequently, if the patient still wishes to achieve his purpose, he does so vicariously, invoking the aid of the latissimus dorsi and coracobrachialis muscles.

Thus, withdrawing his arm backwards by means of the former, he subsequently carries it forward by a movement of circumduction through the help of the coraco-brachialis, and by this artifice relieves the deltoid of its task of raising the arm.

In the more severe types the intensity of the suffering forbids all voluntary or passive exercise of the affected muscle.

So exquisitely sensitive are the inflamed structures that all movements, not only of the muscles of the shoulder and forearm, but even those of the trunk, resound painfully in the disabled deltoid.

The mere anticipation or apprehension of any attempt at passive movement, even of the distal portion of the limb, is sufficient, and before any actual change of position takes place the muscles involuntarily and reflexly contract in their endeavour to prevent or abate the expected suffering (*apprehension contracture of Hayem*).

It is this " contracture through fear " that is so characteristic of the affection; but if the patient's dread can be allayed, and the limb thereby brought into a state of absolute passivity, then this inhibitory spasm of the muscles is not provoked.

With the affected member resting thus inertly in the physician's hand, it is possible to execute passive movements, always providing that the change in position is affected gently, gradually, and without any unevenness or break. Any abruptness instantly foils the attempt by reason of the intense spasm and pain it produces.

Absolute quiescence being imperative, the arm is pinned against the side of the chest, and, indeed, so closely applied is it that tingling and even slight swelling of the hand result from compression of the axillary nerves and vessels.

The forced attitude assumed is due to the reflex contraction excited in neighbouring and functionally allied muscles, those constituting the posterior and anterior axillary folds being chiefly concerned.

By means of this protective mechanism the requisite immobilization is attained, and so efficiently do the muscles charged with this defensive function play their part that frequently they become the seat of considerable pain and cramp in consequence of their prolonged contraction.

Apart from the pain produced by passive movement, the affected muscles are sometimes, though not always, extremely sensitive to pressure.

Hence the almost unendurable nature of the suffering, as, whatever be the posture adopted, it is almost impossible to insure the involved muscle or muscles perfect immunity from the effects of compression or increased tension.

The pain, as in all other forms of fibrositis, is subject to nightly exacerbations, and but too frequently, when the exhausted victim falls asleep, he is rudely roused by a fresh access, as, owing to the protective muscles having relaxed their vigilance, some dragging upon the affected structures lights afresh his suffering.

Indeed, it can safely be affirmed that of all types of fibrositis this brachial variety is the most painful, wringing cries from even the most heroic, when through some mischance a sudden or unintentional strain falls unawares upon the affected muscles and so calls forth the full measure of the anguish.

In the more severe examples the interstitial inflammation, primarily located in the upper arm muscles, pursues its path down the limb, its effects, as Gowers remarks, being usually more pronounced in the *wrist* and *hand* than in the vicinity of the elbow-joint.

When the fibro-muscular structures are so extensively involved, all the symptoms are correspondingly aggravated, and the muscular spasm produced through fear of pain is so intense and persistent that it imparts a peculiar rigidity to the whole limb, which may even simulate a condition of palsy.

The affected muscles may be slightly *swollen*, and *areas of exquisite tenderness* may be detected by palpation.

Complications.

Extension to Joints.—Frequently an extension of the morbid process to the capsules of the joints occurs, its effects being more conspicuous in the shoulder, wrist, and small articulations of the hand.

The *shoulder*, if affected, becomes tender and sensitive, but the pain within it is quite subordinate to that experienced in the muscles. There is no local redness, nor is swelling readily appreciable, owing to the high degree of scapulo-humeral muscular spasm, which may cause the affected shoulder to look even less bulky than its fellow.

The mobility of the joint becomes seriously compromised, though the articular surfaces themselves are unaltered.

Meanwhile the shoulder muscles, especially the deltoid, not only waste, but undergo actual shortening, and *indurations* develop in their substance. Notwithstanding the severity of the morbid process, the electrical reactions undergo little or no change.

But of these untoward arthritic complications, none are more troublesome than those which occasionally develop in the *wris* and *small articulations of the hand.* For here, as in the shoulder-joint, the periarticular structures are severely implicated through extension of the pathological process.

Moreover, the persistent pain and spasm of the related muscles lead to permanent fixation of the joints in abnormal positions, entailing usually some restriction in their range of extension.

Nerve Sheath Involvement.—When, as sometimes happens, an invasion of the sheaths of the brachial plexus takes place, there are superadded the features of *brachial neuralgia or neuritis.* This is more especially prone to occur secondarily to an extension of the morbid process to the subacromial bursa and joint capsule.

In the presence of this complication tenderness of the supraclavicular or axillary portions of the nerve trunks ensues.

In addition *œdema of the hand* develops, and is followed later by typical trophic changes in the skin, desquamation ensuing, while the subcutaneous tissues undergo wasting. The affection of the nerve trunks is usually not of high degree, and is for the most part overshadowed by the symptoms referable to the inflammatory process in the muscles.

The term "atrophic scapular rheumatism" has been suggested for this type, presenting as it does the mixed lesions of myositis, periarthritis, and occasionally neuritis.

Course and Duration.

This is usually very prolonged, lasting for months, and the most protracted cases are those in which the essential rest is deferred or cannot be obtained in the early stages.

With the decline of pain the synergic contraction of the allied muscles tends to disappear; but the peculiar rigidity of the limb may prove exceedingly obstinate, and demands much patience on the part of the sufferer and perseverance on the side of the physician before mobility is restored.

Gowers on this point remarks that "the resulting interference of the use of the part is greater than is proportionate to the amount of rheumatic inflammation, being especially great when much sensitiveness has proceeded from a long-continued pain, and fear of its induction outlasts the danger and exceeds it in degree."

The same observer, moreover, adds that some chronic neuralgic pain is apt to remain, which he ascribes in part to that predisposition to neuralgia which most patients of this class possess.

Diagnosis.

Age and Sex.—Middle-aged and elderly persons of both sexes are mostly affected.

Previous History.—Evidences of ancestral or acquired gout, or of fibrositis elsewhere, lumbago, sciatica, etc., can be elicited.

Distribution.—This is always unilateral.

Symptoms.—Pain ranging from slight discomfort to anguish, located *not in the nerve, but in the affected muscles,* is present, and is commonly referred to their tendinous attachments.

It does not radiate down the arm unless there be pressure on the nerve by a nodule. In complete quiescence pain is slight or absent, but is instantly evoked by active or passive movement of the affected muscles, their antagonists, or synergic allies.

If complete passivity of limb be attainable, passive movements may be achieved painlessly.

Local Signs.—The upper arm is closely adducted to the thorax. Peculiar spasmodic rigidity of the whole limb is present. The affected muscles are slightly swollen, with areas of exquisite tenderness. In later stages there is wasting of the affected muscles, especially the deltoid, with formation of *nodules or thickenings.*

Course of Disease.—This is usually very protracted.

Complications.—Extension of the morbid process to capsule of the joints or to the sheaths of brachial plexus, with resulting neuralgia or neuritis, often occurs.

Differential Diagnosis.

Brachial Neuralgia.

Age and Sex.—The subjects are of either sex, and usually over fifty years of age.

Previous History.—This usually reveals evidences of a gouty or rheumatic diathesis.

Distribution.—It is unilateral, and affects more often the right arm.

Symptoms.—Pain is more spontaneous and lancinating than in fibrositis. It is located *not in the muscles, but in the nerve trunks,* it radiates down the limb, commonly along the ulnar nerve, and sometimes *points douloureux* are present. The pain is not so definitely associated with movement, and, though excited by exercise, not so infallibly as in fibrositis. In fibrositis the patient is afraid to move the limb, but in brachialgia finds relief in perpetual change of its position.

Passive movements are painless during the intervals of paroxysms, while there is an absence, on passive exercise, of that secondarily induced muscular spasm which follows, or even precedes, such attempts in brachial fibrositis.

Local Signs.—These are absent unless the brachial neuralgia be secondary to fibrositis, and produced by pressure on the nerve trunks by nodules.

Brachial Neuritis.

Age, Sex, and *Previous History.*—These correspond with those met with in brachial neuralgia.

Distribution.—This is rarely unilateral, unless *secondary* to fibrositis, etc.

Symptoms.—Persistent and intense pain with paræsthesiæ and tenderness of nerve trunks are present. Muscular wasting and paresis, together with sensory impairment and trophic changes, are found.

(In brachial neuritis, when it ensues secondarily to fibrositis through extension of the morbid process to the nerve sheaths, muscular wasting and impaired sensation are rare; but tenderness of the nerve trunks in the supraclavicular or axillary regions is always present, and atrophic œdema of the hand is not uncommon.)

Arthritis Deformans of Cervical Column.

Hypertrophic Type.—In this variety root symptoms are not uncommon, and give rise to unilateral brachialgia of severe type, with, but very rarely, atrophic paralysis.

The diagnosis will rest upon the following points:

Rigidity and thickening of cervical column, detection by palpation or radiography of *exostoses* in the neighbourhood of intervertebral foramina, and osteo-arthritic changes in the peripheral joints—*i.e.*, Heberden's nodes.

Atrophic Type.—Root symptoms may supervene in the atrophic or rheumatoid variety of spondylitis, and have been shown by Lepine and others to be due to meningeal changes.

In one case of our own the eighth cervical and first dorsal nerve-roots were specially implicated, as shown by pupillary phenomena, and an extensive herpetic eruption over the sensory areas supplied by these particular roots.

It is not sufficiently recognized that in some instances the primary manifestations of rheumatoid arthritis take place in the cervical column, and the resulting pains are frequently confused with those of chronic rheumatism.

The signs to rely on will be—

Restricted mobility of cervical column, the results of skiagraphy, and the presence of peripheral joint changes of the same nature.

Hypertrophic Cervical Pachymeningitis.

We have known this condition to be erroneously diagnosed as one of " chronic rheumatism. "

Confusion is, of course, only likely in the *initial neuralgiform* *stage*, which may last for months before it gives place to the paralytic phase.

Tenderness of the vertebræ, a history of *syphilis*, and careful noting of the paths of distribution of the pains should suffice to prevent error.

Cervical Caries and Malignant Disease of Cervical Column.

Pressure pains occurring in this association are less liable to confusion with rheumatism, as they are usually *bilateral*, though in the early stages of malignant disease they are unilateral. For further points of differentiation, refer to previous sections dealing with the differential diagnosis of torticollis.

Referred Visceral Pain.

Inasmuch as *cardiac disease*, especially of aortic type, also *aneurysm* of the aorta or subclavian artery, may be accompanied by neuralgiform pain in the arms, especially the left, it is essential that in all cases of pain in the upper extremity the thoracic viscera should be carefully examined.

We have on more than one occasion in our own experience seen the referred pains of aortic aneurysm confused with rheumatism.

The pain in these cases follows a *root* distribution, and is usually referred to the ulnar side of the arm.

Chronic Brachial Fibrositis.

Its fundamental etiological factors are identical with those of the acute form, and need not be further expatiated upon.

The sole vexed question in the etiology is its relationship to *trauma*, as localized fibrous hyperplasias—indistinguishable from those of chronic rheumatism—often develop as the result of local injury.

The greatest care, therefore, should be taken, before deciding as to the nature of a case, to exclude such traumatic factors, not forgetting that the formation of such overgrowths is a very gradual process, and that the injury responsible may be of remote date.

Chronic fibrositis occurs very frequently in the upper extremity, and Norstrom, who has devoted much attention to the subject, claims that he has met with objective evidences of it at one time or another in every individual muscle of the forearm.

He qualifies this statement with the remark that he has never met with " rheumatic myositis " of the *biceps*, any inflammation of its substance being, as far as his experience goes, always of traumatic origin.

As in the acute form, the deltoid is the muscle in which a state of interstitial inflammation most frequently develops, either in sequence to an acute attack, or maybe arising *de novo.*

Clinical Account.

It is important to realize that the pathological process, even when attended by infiltration, may develop *insidiously*, and without any subjective symptoms whatever.

Thus, it frequently happens that the patient is unconscious of anything being amiss till a sudden acute attack of pain strikes him during the performance of some particular movement.

Naturally, he is apt to infer that he has in some way or other strained the muscle, whereas he has, as a matter of fact, compressed some induration, which temporarily has undergone swelling as a consequence of draught, toxic irritation, or some other exciting cause.

Such attacks of pain, as usual, come on more commonly on rising or after resting, and, though they may for the moment be utterly disabling, they tend to pass off with continued exercise or after vigorous friction.

Pain in such cases is often solely referred to the humeral insertion of the deltoid, and is only brought out when the muscle is contracted.

In some cases, however, if the induration impinges on a nerve trunk, the pain may be referred wholly to the hand, which may be the seat of tingling and formication.

In any case, therefore, in which recurring attacks of so-called "rheumatic" pain take place in the deltoid or any other muscles of the shoulder, girdle, or arm, it is essential that these structures should be subjected to careful and repeated palpation.

It will be found that in each exacerbation the pain infallibly has its origin at a spot in which during the intervals a nodule or thickening has been located by palpation.

It is important, also, to recognize that a considerable degree of functional disability accompanies the formation of nodules, and quite a notable amount of paresis may develop.

In those cases in which the complaint is made of occasional and sudden acute pain in the front of the shoulder, the biceps should be carefully examined for the presence of indurations.

Recently one of us was consulted by a lady, the subject of recurring attacks of fibrositis. The long head of this muscle was picked out, but no pain was experienced save when the muscle was brought into action. The nature of the trouble was established by the fact that simultaneously she suffered with "rheumatic" pains in the lower extremities, attended by nodules and infiltrations in the muscles of the calves, and also in the outer and lower portion of the fascia lata of the thigh.

Dispersal of these latter by persistent massage permanently disposed of the pain in this region, and similar treatment applied to the affected biceps was followed by complete recovery, notwithstanding a previous duration of some months.

Myositis in the forearm chiefly has its site in those muscles that take origin from the *external* condyle, the extensors and supinator longus, and which in the same manner lead to recurring attacks of pain during the performance of movements entailing the contraction of the affected muscles.

As before stated, nodules have been found in the muscles of the forearm and the hand in the subjects of writer's cramp.

In conclusion, it is noteworthy that such fibrous deposits have been much more rarely met with in those muscles arising from the internal condyle, the flexors and pronator radii teres.

The Course and Duration is essentially indefinite, the tendency of the disorder being to persist with remissions and exacerbations. The more extensive the indurations, the greater the likelihood of endless recurrences. Where they are localized and accessible to treatment, their dispersal or excision may cut short the affection as far as that particular manifestation goes. But we have always to reckon with the underlying causal state, whose successful treatment will alone guarantee us freedom from recurrences.

Diagnosis.

The diagnosis of the more chronic types of brachial fibrositis must be arrived at by the same measured method pursued in regard to the acute. The salient points of difference are the more localized character of the affection and the more subdued nature of the pain.

Thus, the morbid process may be restricted to the scapulohumeral or deltoid muscles; but it may be experienced only in those of the forearm. The pain, too, though less severe, is more constant; but sudden twinges of extreme severity may ensue when the muscle is thrown into active contraction.

Lastly we have the important fact that indurations or thickenings in these chronic forms are always to be detected by palpation in the affected muscle.

The salient symptom—pain in the upper extremity—being one common to many disorders, it is highly desirable that we should be alive to the many pitfalls that beset its diagnosis.

In the preceding section on differential diagnosis of the acute type we have alluded to many possible sources of confusion, and these need not be reiterated. But there are certain fallacies which more particularly pertain to the diagnosis of chronic types of brachial fibrositis, and to these we shall now pass on.

The chief sources of error are occupation myalgias, static brachialgias, osteo-arthritis of the shoulder, and referred pains due to visceral disorders.

Differential Diagnosis.

Occupation Myalgias.

Of all the various affections that wear the mask of chronic rheumatism, none simulate it more successfully than the class now under consideration. Opinions differ widely as to their causation, and, though they often pass as examples of "craft-neuroses," there is little doubt, as Oppenheim states, that in some cases they are of definitely *myogenous* as opposed to neurogenous origin—a view also advocated by Bittorf and others.

Before, therefore, assigning any case offhand to a "rheumatic" category, we should inquire as to the patient's occupation, and whether it entails excessive or constant repetition of movements subserved by the affected muscle or group of muscles, for there is little doubt that constant over-exercise of particular muscles may produce minimal anatomical lesions in consequence of slight oft-repeated strains. These, again, lead to the production of small fibrous overgrowths, which, under the influence of the various exciting causes of chronic rheumatism, give rise to aching and stiffness; hence the constancy with which such errors in the etiological diagnosis occur.

For further consideration of this important question we would refer the reader to a coming section on traumatic fibrositis, especially that portion dealing with injuries of the forearm muscles.

Static Brachialgias.

Apart from excessive exercise, the use of muscles at a mechanical disadvantage is also a frequent source of confusion.

Now, as we know, muscles that are remotely situated from each other may yet be functionally allied. The explanation is probably that the scapulo-humeral muscles, from sympathy with their overworked allies of the forearm, begin to be the seat of pain and stiffness.

To take a simple example, mechanics, filers, and so on, if working at a bench too high for them, suffer frequently from

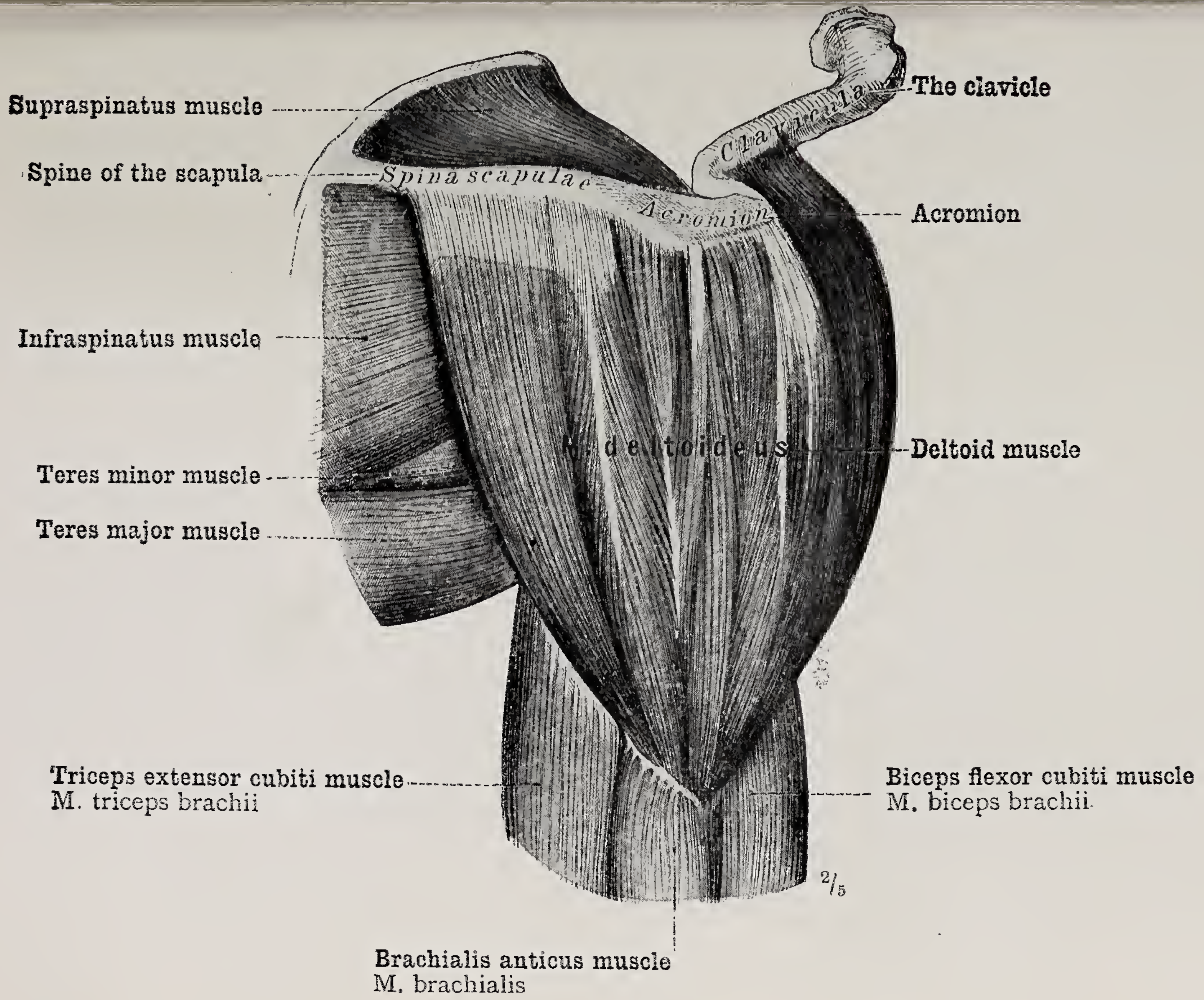


Fig. 34.—Deltoid muscle of the right side, dorso-external aspect, showing its relations to the adjoining muscles of the shoulder and of the upper arm. (Toldt's Atlas.)

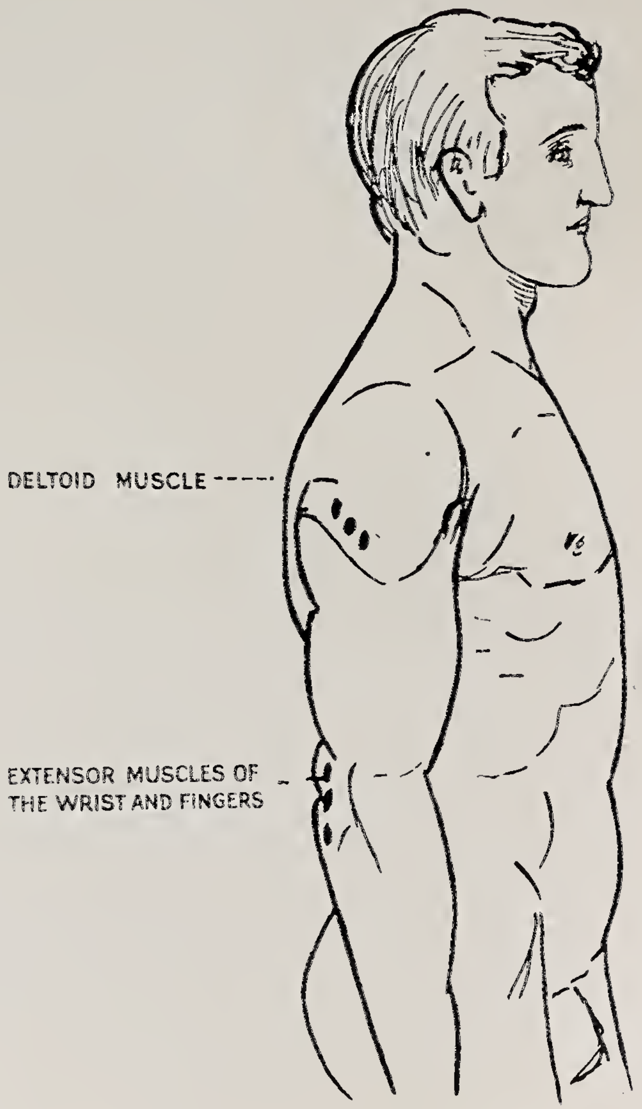


Fig. 35.—Chronic brachial fibrositis. The diagram illustrates the sites at which nodules are most commonly found in the upper extremity.

To face page 226.

pain in their shoulder muscles. This is due to the fact that, in using their various tools, they are hampered by being unable to put the weight of their trunk into their thrust. This disability has, of course, to be met by additional work on the part of their shoulder muscles, which are apt to give out from the undue call made upon them. Women engaged in laundry-work, ironing, etc., are prone to suffer in precisely the same manner, and for the same static reason.

Bernhardt of Berlin has also drawn attention to a painful affection, dubbed by him "epicondylalgia," in which the condyles of the humerus become painful after some unwonted exertion, involving long strain of the muscles attached to the condyles, such as the carrying of a heavy handbag.

Walsh of New York has also noted a similar brachialgia develop in American women when the fashion of long skirts prevailed. The pain through constant holding up of these heavy garments is felt in the muscles of the forearm in the neighbourhood of the wrist.

The class of patients who come to us with such complaints are too often overworked, frequently neurotic, and nearly always, for some reason, below par. They are apt to refer their troubles to draughts or to overheating, and this, taken together with the fact that such pains are frequently worse at night or in damp weather, leads to their being classed as "rheumatic" in nature. The erroneous diagnosis may run for years unchallenged, and naturally, unless the conditions of work be altered, no form of treatment avails.

We would, therefore, lay special stress on the importance of investigating the nature of the occupation, and more particularly the conditions, mechanical and otherwise, under which it is pursued.

Apart from these general conditions, however, we may derive considerable help from the special characteristics of the pain experienced in these occupation myalgias.

The pain is definitely associated with certain movements, usually those incidental to particular occupations. At first it is delimited to the muscles concerned, and the disability does not extend to other movements. Tenderness of the nerve trunk is usually absent, though the implicated muscle or muscles may be sensitive to pressure. The effect of rest, change of occupation, or altered mechanical conditions, in the slighter cases, clearly proves the causal connection, though relapses are frequent in the neurotic, or those, the subjects of toxæmia, alcoholic or otherwise.

In conclusion, the symptoms produced by excessive or faulty use of the muscles may simulate very closely those of muscular fibrositis, and where nodules and infiltrations can be detected in the muscles complained of, their relegation to that category would be justifiable.

But a large number of these cases are devoid of such objective signs, and we would protest against the haphazard manner in which they are dubbed "rheumatic," to the ignoring of the associated and, we believe, causal static, or mechanical factor.

Osteo-Arthritis of the Shoulder.

The brachialgia that arises secondarily to osteo-arthritis of the shoulder is frequently misconstrued as being due to "rheumatism" of the surrounding muscles. Only in the early stages of osteo-arthritis should confusion be possible, but even at this period the more or less strict localization of the pain to the joint or outer aspect of arm should arouse suspicion.

If, on further examination, there is marked limitation of mobility, especially of abduction and elevation, with creaking or crackling on movement, these will afford certain indications of the primary articular site of the disorder—a presumption that will probably be confirmed by the revelation of osteophytes on skiagraphy.

Referred Pains from Visceral Disorders.

These may be localized in the muscular region or down the arm. Their importance in this connection lies in the fact that a patient is often said to be suffering from "rheumatism" of the shoulder, when in reality the pains complained of are due to *pulmonary*, *hepatic*, or *cardiac* disease.

Other conditions that it is well to bear in mind are the referred pains of bicipital bursitis, and also those associated with Von Recklinghausen's disease when situated in the forearm.

Bicipital Bursitis.

Located between the tendon of the biceps and tuberosity of the radius, this bursa may occasion pains in the forearm by pressure on the median and interosseous nerves.

Such referred pains may readily be confused with rheumatism, as, though occasionally distension of the bursa is present, more often nothing objective save tenderness to pressure over the tuberosity of the radius can be elicited. The characteristic sign is as follows:

Pain only occurs when the elbow is flexed with the forearm in a position of supination, though movement of this joint with

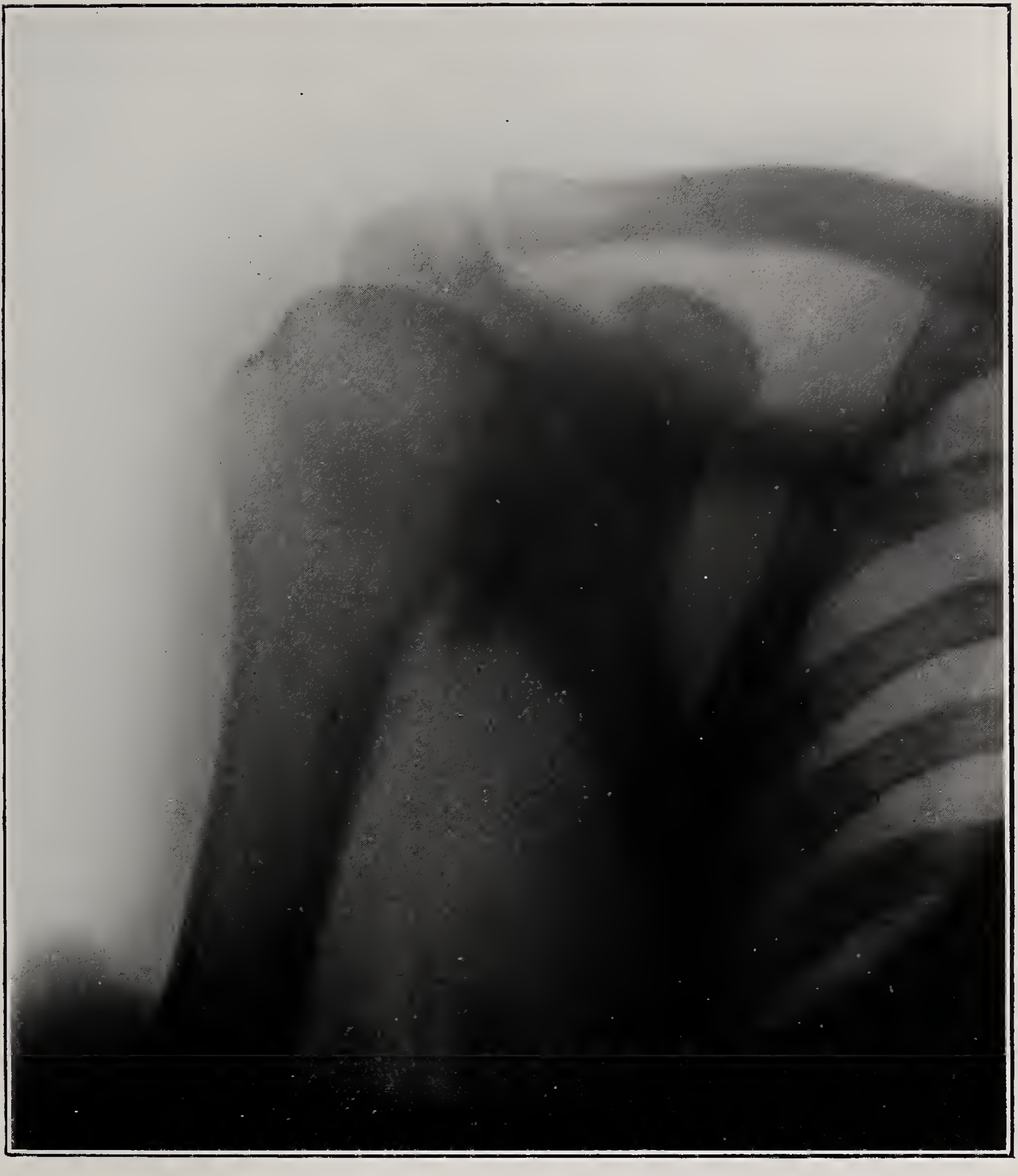


Fig. 36.—Skiagram of shoulder-joint, showing osteo-arthritic changes, a remote sequel to direct injury.

To face page 228.

the forearm pronated is painless. In the former movement the biceps is chiefly concerned; hence the pain from compression of the bursa. In the latter the brachialis anticus alone is involved.

Von Recklinghausen's Disease.

This rare condition we have seen confused with rheumatism in the forearm. The subject, a young woman, was, under this conception of the nature of the disease, sent to Bath for treatment.

The pains experienced were symmetrical, being felt in both forearms; but on examination the multiple swellings associated with this condition were easily appreciable under the skin, and the diagnosis was subsequently confirmed by Professor Michell Clarke of Bristol.

CHAPTER XV

REGION OF TRUNK: LUMBAGO

Acute Muscular or Tendinous Variety.

Synonyms: Lumbo-sacral or lumbar fibrositis; myalgia lumbalis.

Anatomical Considerations.

In view of the complexity of the structures involved in lumbago, it will perhaps be wise to deal, by way of introduction, with the essential anatomical features of the lumbar region.

The interval between the last rib and iliac crest is filled in by the following structures: The latissimus dorsi, the external and internal oblique, the transversalis, the various layers of the fascia lumborum, also the erector spinæ and quadratus lumborum.

Of the foregoing, the fascia lumborum calls for detailed notice, for this dense fibrous membrane has somewhat complex anatomical relationships.

It constitutes the posterior aponeurosis of the transversalis muscle, and, extending from the last rib to the iliac crest, is attached internally to the lumbar spines and tips and roots of the transverse processes of the lumbar vertebræ.

Now, this fascial expansion divides behind into three layers, which enclose two well-defined spaces, the anterior ensheathing the quadratus lumborum, while the posterior envelops in similar fashion the erector and multifidus spinæ muscles.

Two important nerve trunks pierce this sheath of fascia, the last intercostal and the ilio-hypogastric, the former near its upper margin, and the latter near its attachment to the ilium.

It must not be forgotten, too, that the latissimus dorsi practically overlaps the whole of the lumbar fascia, taking origin as it does from the lumbar and sacral spines and supraspinous ligaments.

We have entered at this length into the anatomical peculiarities of the lumbar region, as acquaintance with them is essential for appreciation of the varied symptomatology of this common everyday affection.

Etiology.

Unlike its analogue in the cervical region—torticollis—lumbago is met with almost exclusively in the middle-aged and old, only isolated cases occurring in young adults.

Its subjects are practically always of the male sex, and the older physicians believed it to be especially common in those of bilious or sanguine temperament. It is currently held to be more frequent in spring than in summer, and its incidence, without doubt, is closely connected with abrupt changes in temperature.

Exposure to damp is a factor whose exciting influence is often conspicuously direct. Thus, sitting in damp clothes, especially those in immediate contact with the loin, almost invariably in a predisposed person provokes an attack.

But the most striking feature of its etiology is its frequent association with a gouty habit of body—a peculiarity more obvious in this than in any other form of fibrositis.

Thus, it often alternates with other gouty manifestations, either in the joints or nerve trunks, while not uncommonly its subjects suffer from recurring bouts of migraine.

The predisposing influence exerted by occupations entailing forced or strained attitudes has been dealt with in the section on general etiology, as likewise the vexed question of the relationship of the disorder to trauma.

Clinical Account.

Prodromal Symptoms.—In some instances lumbago is preceded by what we may call " premonitory symptoms."

Thus, some subjects complain of sensory paræsthesiæ in the region of the loins, which may be the seat of tingling, pricking, or itching sensations.

Others, again, may be forewarned of its approach by a certain embarrassment in the movements of the trunk, a lack of accustomed suppleness or flexibility.

Oftentimes its onset is anticipated by a period of digestive incapacity, or a condition of definite gastric catarrh with slight pyrexia and fleeting neuralgic or fibromuscular pains.

Occasionally its occurrence marks the termination of a period of exceptionally good health—a peculiarity very characteristic of gout, an outbreak of which not unfrequently supervenes in sequence to a state of exuberant well-being and buoyancy.

Mode of Onset.—In its most classical form this is of dramatic suddenness, the astonished subject being taken unawares with acute pain in the lumbar or sacral region.

The pain usually flashes out during the performance of some particular movement, and arrives forthwith at its maximum intensity, spreading from side to side across the affected region, and often leaving behind it a glowing sensation.

It may grip a man while lying in bed, and so agonizing is the suffering excited by any effort to rise or turn that he sinks back, with a baffled feeling of helplessness. Or perchance it may seize him while standing erect, when he finds it extremely difficult to revert either to a sitting or a recumbent posture.

In other instances it lays hold of a man while straightening his trunk during a morning shave, and gripping him midway, as in a vice, transfixes him in an attitude of slight anteflexion.

Or it may be in the act of stooping to put on his boots that an attack ensues, and for the nonce he finds it wellnigh impossible to move one way or the other.

In one of us acute lumbago abruptly developed when, after prolonged bending over a patient while passing a catheter, an attempt was made to assume the erect position.

There is something peculiarly disabling about the pain in this disorder, for so excruciating is it that it temporarily inhibits all movements of the trunk, and thus it happens that, whatever be the position of the patient at the time of seizure, there he must for a moment or two perforce remain.

Leonard Williams, commenting on the frequency with which the malady supervenes during the course of a cold morning tub, suggests the possibility that the resulting inhibition of movement may be at the root of some bathing fatalities.

Suddenness of onset and great severity are more typical of *primary* than subsequent attacks, which are commonly neither so acute nor so abrupt in their manifestation.

But even in the mildest forms a quite remarkable degree of disability attaches to the complaint. Thus, a man may walk about and attend to his work, and yet be quite unable to stoop to the floor to pick up any object without bending his knees.

Grown wary by experience, such subjects move circumspectly, are mindful not to assume unwonted positions, and studiously avoid remaining long in the same posture.

But in the most acute forms any movement whatever is out of the question. Even a deep breath or a sigh, much less an inadvertent or sudden change of position, produces intense agony.

When at its zenith, the patient may present the aspect of infirm old age, for he may be quite unable to walk without assistance, and then only with his back almost bent double.

Very rarely the vicious attitude assumed is one of slight overextension of the spine, the subject seemingly finding relief from his pain in leaning backwards.

Again, others to relieve their pain rest their elbows on the arms of a chair, seeking thus to take the weight off the lumbar spine.

Constitutional Symptoms.—Owing to the nightly aggravation of the pain, insomnia and restlessness may add to the patient's discomfort; but as a rule towards early morning an outbreak of perspiration marks the return of a daily amelioration.

In many instances profuse local sweating over the lumbar region is a prominent feature, and, as before pointed out, this circumscribed hyperidrosis, by favouring local chilling of the skin's surface, is a fertile source of relapses or exacerbations.

A slight rise in temperature is by no means uncommon, but is of ephemeral type, and generally to be seen in those cases directly attributable to the effects of chill.

The tongue is frequently coated, and there is often flatulence, with perhaps some headache, or fleeting neuralgias elsewhere, more commonly in the supra-orbital or temporal regions.

As Hilton Fagge long since pointed out, the urine in these cases is often highly acid, dark-coloured, or loaded with urates.

Subjective Symptoms.

Site of Pain.—The exact location of the pain experienced in lumbago is very variable, and its consideration has given rise to not a little contention.

This is not surprising, having regard to the largely subjective nature of the malady and the variety of the structures concerned, embracing, as they do, not only the lumbar muscles and their related aponeuroses, but also in some instances the vertebral articulations.

In the purely muscular or tendinous types of lumbago the pain is *always bilateral* in distribution, though it is often more severe on one side than the other.

Hilton Fagge, it will be remembered, claimed that the erectores spinæ were the muscles chiefly implicated in lumbago, and we would lay stress on the fact that in such cases the *ilio-costalis* muscular bundle is the one chiefly affected.

But the quadratus lumborum is also commonly involved, either independently or coincidently.

In those examples where the morbid process has its seat in the fleshy bellies of the muscles, the pain is experienced definitely in the region of the loins.

Some authorities have contended that the pain in lumbago is not in the lumbar regions, nor, indeed, in the loins at all, but in the sacral region.

This contention is contradicted by the fact that in chronic or oft-recurring forms of lumbago muscle nodules are to be met with in the quadratus lumborum, the latissimus dorsi, also the deep muscles of the back, as well as the lumbar aponeuroses.

But the morbid process, while it may at first be confined to the interstitial fibrous tissues of the muscles, frequently displays a tendency to extend to their tendinous attachments—a fact easily explicable by the continuity of these structures.

Consequently, in keeping with this, the pain at first felt in the loin may ultimately be experienced in the sacral region.

Frequently, however, the march of the disease is reversed, and it begins in the tendinous attachments of the dorsal muscles to the back of the sacrum and the iliac crest. In that event intense pain will be felt across the sacral region and in the fibrous tissues over *both* sacro-iliac joints. But where the pain, instead of being symmetrical, is strictly localized to *one* synchondrosis, it can always be traced to *strain* or *injury.*

Lastly, it must be remarked that many French authorities claim that there is an *articular type of acute lumbago.* In these cases the morbid process seems to be localized in the lateral intervertebral articulations of the lumbar column, which are the seat of pain, and are sensitive to pressure when applied over the particular apophyses affected.

Generally the joints on one side are predominantly involved, but not invariably. When symmetrical, the patient leans slightly forward, and *hyperextension of the column* is extremely painful.

If the joints on one side are chiefly affected, the subject usually develops a list of the trunk to the opposite and less affected side. While the clinical features of these cases—more especially the sites of pain and tenderness—seem to point to such a localization, there is no direct evidence forthcoming in proof thereof.

The points favouring such an hypothesis in any given case would be absence of tenderness to pressure over the sacro-lumbar muscular masses, and the presence of sensitiveness over the lateral intervertebral articulations. Again, another helpful point is that in the purely muscular forms passive movements can be effected painlessly; but active movements notably increase the suffering. As opposed to this, in the articular form the pain is aggravated by passive as well as active movement. The course of this supposed articular type of acute lumbago differs in no way from the muscular, and though perhaps, if anything, more distressing in character, it is, fortunately, of equally brief duration.

Character of Pain.—This is very variable in degree, but in its most severe forms is of excruciating intensity, and sometimes of tearing or lancinating nature.

Even the equanimity of the Iron Duke seems to have been ruffled under its influence, and in his despatches somewhat testily he complains: "I am much annoyed by the lumbago, a disorder to which, I believe, all persons in camp are liable."

The philosopher Johnson's respect for the malady may be gauged from one of his letters to Mrs. Thrale, in which he tells her: "The rheumatism has come again into my face and mouth, but nothing yet to the lumbago."

The attitude of physicians themselves, on the other hand, is somewhat less consistent, for while some dismiss it almost contemptuously, others, like Graves, have a wholesome respect for it; indeed, the old Dublin physician, speaking out of the fulness of personal experience, advised that all persons seized with lumbago should take to their beds and forthwith be cupped.

Albeit infinite gradations in severity occur, and in the milder forms the pain savours more of a dull, wearisome ache, while in other more fortunate individuals a sensation of tingling and numbness, rather than of actual suffering, is complained of.

But the distinctive characteristic of the pain in its more acute form is the fact that it is aggravated or rendered unendurable by the slightest movement of the trunk in any direction.

In common with all forms of acute muscular fibrositis, it is increased not only by all volitional movements of the affected muscles, but the same aggravation of suffering follows movement on the part of their antagonists.

On the other hand, *passive* movement of the trunk may be achieved painlessly, if carried out with full acquiescence of the patient, and performed smoothly and steadily, so as to obviate any variation in tension of the affected muscles.

In these acute types, if comparative ease is to be secured, absolute rest is essential. If this can be compassed, the pain is always slight, almost invariably tolerable, and may be completely absent. The patient, therefore, soon realizes that the greatest relief is to be obtained when lying down.

Even then, in very severe cases, despite the voluntary immobilization and instinctive relaxation of the muscles, he may find it almost impossible to arrive at a position of perfect ease, so multiple, incessant, and unconscious are the involuntary synergies occurring even in muscles which are essentially voluntary.

The intensity of distress occasionally gives rise to secondary phenomena. Thus, while coughing, sneezing, or even defæcation, aggravates the pain, in some instances even ordinary respiration becomes hampered.

This, presumably, is attributable to traction of the respiratory muscles on their spinal attachments, and hence a feeling of oppression is added to that of pain.

Lumbago in Animals.—Horses, cattle, and dogs are especially liable to be attacked by this variety of muscular fibrositis, and the features of lumbago are often very graphically portrayed in these domestic animals.

In horses the same stiffness of carriage is to be observed—a dragging gait, and difficulty in getting up; and such is the sensitiveness and weakness produced in the hind-quarters that they may sink to the ground, and be quite unable to rise again.

We may add that this is true of "muscular rheumatism" in horses even when uncomplicated by hæmoglobinanæmia.

The same secondary phenomena, too, occur in animals as in man, and in horses and cattle the breathing occasionally becomes extremely laboured.

In the same way, a dog suffering from lumbago will yelp at one's approach, the pain being obviously aggravated through the contraction induced in the affected muscles by the mere apprehension of any attempt being made to lift it from the ground.

In its endeavour to avoid pain, the animal walks in a strained and timid manner, finds the ascent of stairs difficult, and even impracticable, while, the attitude assumed for defæcation being painful, it is instinctively avoided, and obstinate constipation ensues.

Objective Phenomena.

Inspection of the lumbar region reveals no change in colour or swelling of the overlying skin, but local hyperidrosis is not uncommon.

Palpation, however, of the affected muscles shows them to be exquisitely sensitive to pressure. This is more marked at certain spots, which feel soft and doughy in consistence as a result of serous exudation into the interstitial tissues at these points.

In the first few hours of the affection even this cannot be made out. But if massage of the affected muscles has formed part of the treatment, the painful areas, whether in the fleshy or tendinous parts of the muscles, can almost always be located, inasmuch as they respond by swelling and increased sensitiveness.

Not only is the affected region painful to pressure, but the loin feels fuller, and the underlying muscles extremely tense and contracted.

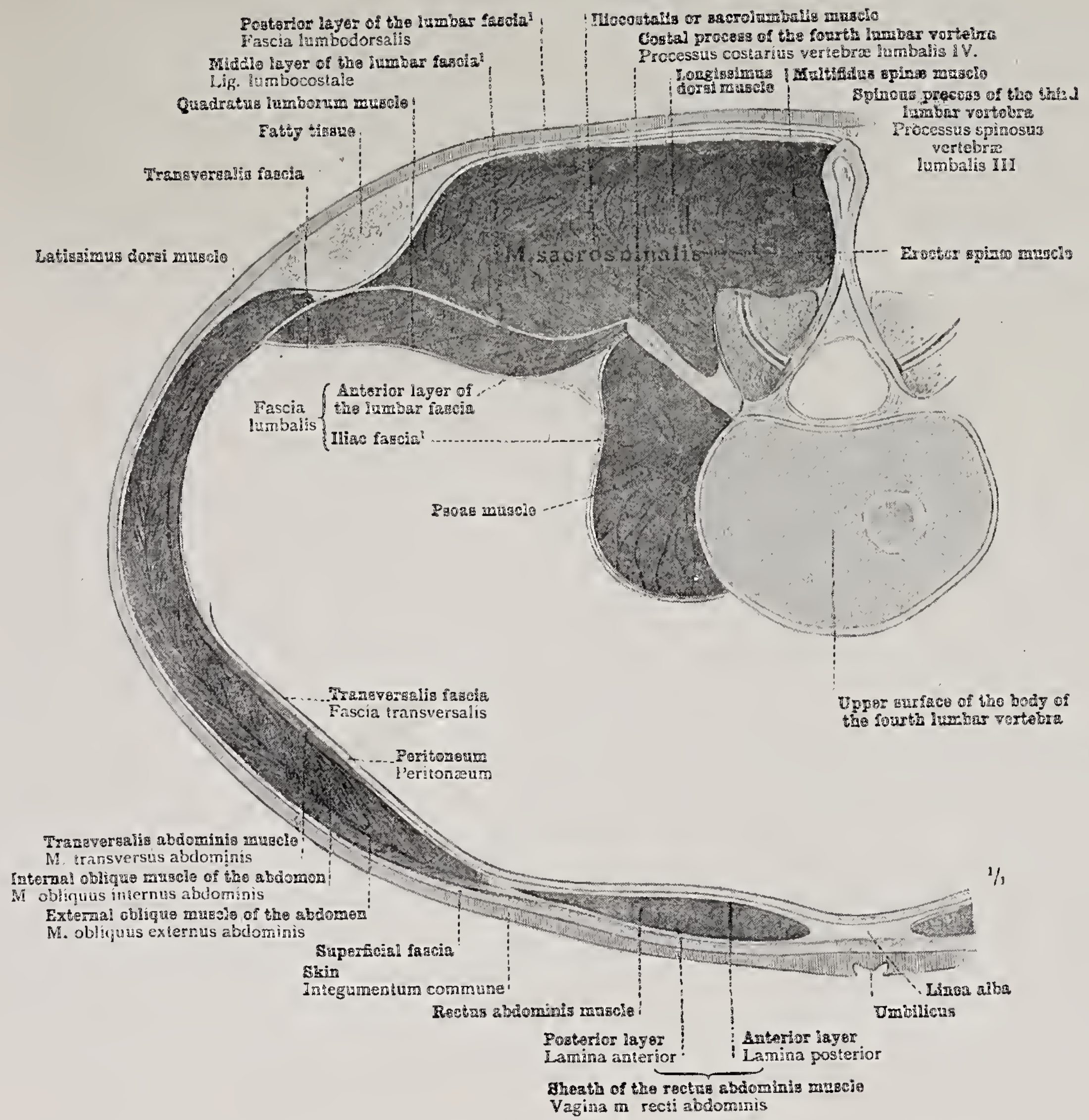

Posterior layer of the lumbar fascia¹
Fascia lumbodorsalis
Middle layer of the lumbar fascia¹
Lig. lumbocostale
Quadratus lumborum muscle
Fatty tissue
Transversalis fascia
Latissimus dorsi muscle
Iliocostalis or sacrolumbalis muscle
Costal process of the fourth lumbar vertebra
Processus costarius vertebræ lumbalis IV.
Longissimus dorsi muscle
Multifidus spinæ muscle
Spinous process of the third lumbar vertebra
Processus spinosus vertebræ lumbalis III
M. sacrospinalis
Erector spinæ muscle
Fascia lumbalis
Anterior layer of the lumbar fascia
Iliac fascia¹
Psoas muscle
Upper surface of the body of the fourth lumbar vertebra
Transversalis fascia
Fascia transversalis
Peritoneum
Peritonæum
Transversalis abdominis muscle
M. transversus abdominis
Internal oblique muscle of the abdomen
M. obliquus internus abdominis
External oblique muscle of the abdomen
M. obliquus externus abdominis
Superficial fascia
Skin
Integumentum commune
Rectus abdominis muscle
Posterior layer
Lamina anterior
Anterior layer
Lamina posterior
Sheath of the rectus abdominis muscle
Vagina m. recti abdominis
Linea alba
Umbilicus
¹/₁

FIG. 37.—The stratification of the muscles of the trunk and of their associated fasciæ displayed in a horizontal section of the right half of the body wall. The connections between the anterior aponeuroses of the wide muscles of the abdomen and the sheath of the rectus are shown. (Toldt's Atlas.)

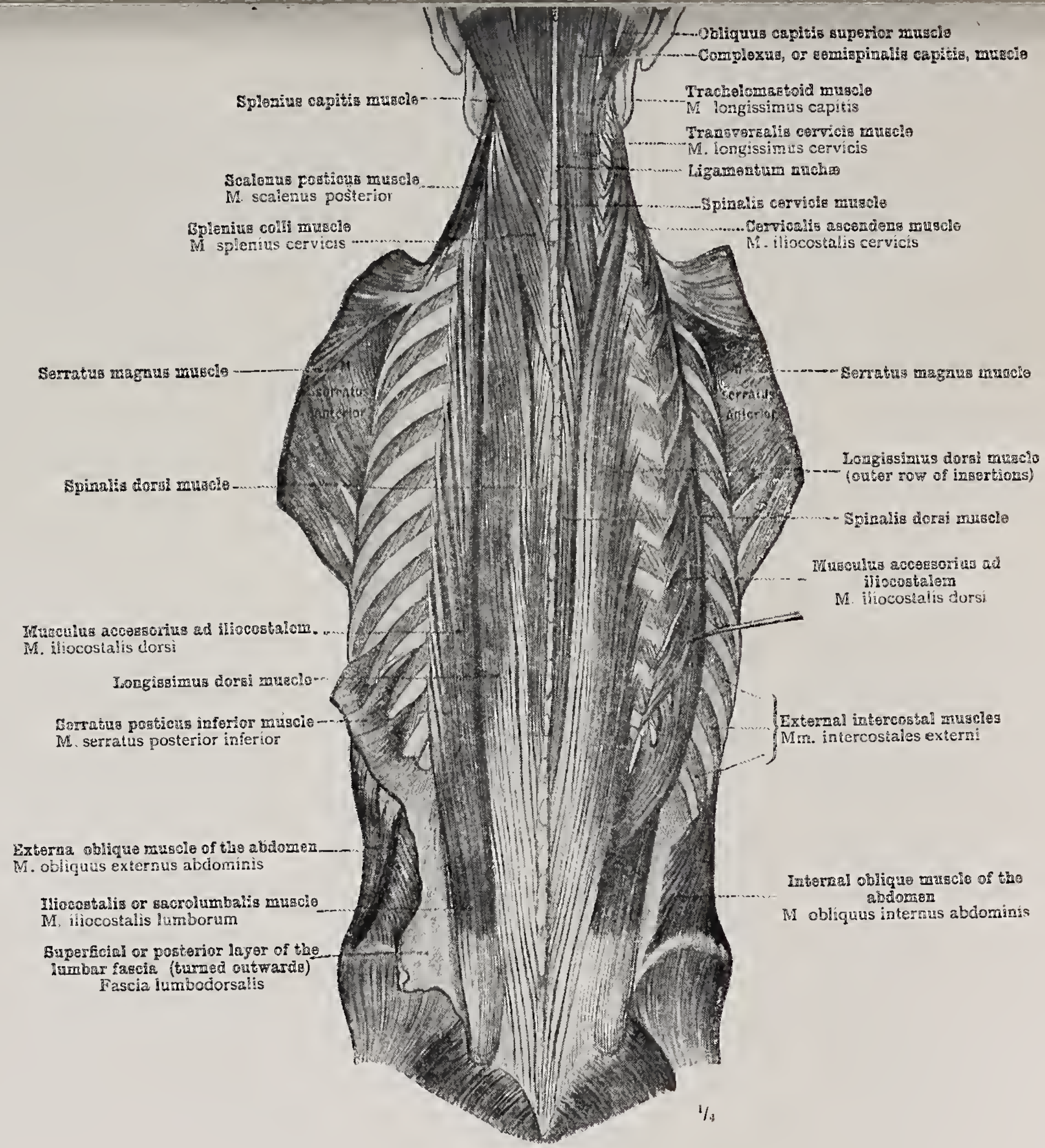

Obliquus capitis superior muscle
Complexus, or semispinalis capitis, muscle
Splenius capitis muscle
Trachelomastoid muscle
M. longissimus capitis
Transversalis cervicis muscle
M. longissimus cervicis
Ligamentum nuchæ
Scalenus posticus muscle
M. scalenus posterior
Spinalis cervicis muscle
Splenius colli muscle
M. splenius cervicis
Cervicalis ascendens muscle
M. iliocostalis cervicis
Serratus magnus muscle
Serratus anterior
Serratus magnus muscle
Serratus anterior
Longissimus dorsi muscle
(outer row of insertions)
Spinalis dorsi muscle
Spinalis dorsi muscle
Musculus accessorius ad iliocostalem
M. iliocostalis dorsi
Musculus accessorius ad iliocostalem.
M. iliocostalis dorsi
Longissimus dorsi muscle
Serratus posticus inferior muscle
M. serratus posterior inferior
External intercostal muscles
Mm. intercostales externi
Externa oblique muscle of the abdomen
M. obliquus externus abdominis
Iliocostalis or sacrolumbalis muscle
M. iliocostalis lumborum
Superficial or posterior layer of the lumbar fascia (turned outwards)
Fascia lumbodorsalis
Internal oblique muscle of the abdomen
M. obliquus internus abdominis
¹/₃

FIG. 38.—Third layer of the muscles of the back (long muscles of the back). They consist of the ilio-costalis (sacro-lumbalis) and the longissimus dorsi with their prolongations upwards—accessorius, spinalis, and splenius muscles. (Toldt's Atlas).

To face page 236.

This state of spasm is intensified immediately the muscles are touched in the course of examination. At the zenith of the attack this tenseness is uniform over the whole loin, communicating to the finger a board-like hardness.

During this period, the overlying fascia being so tensely stretched by the subjacent swollen muscles, it is impossible to appreciate their individual contours.

With the decline of the acute symptoms the fulness and general tension of the lumbar muscles diminish very largely, but the hypertonus always persists longer in the chiefly affected muscles. Often the ilio-costalis, which, as it stretches upwards and outwards to be inserted into the lower six ribs, stands out as a tense swollen cord. Pressure upon it immediately evokes suffering, although all subjective complaints may have passed away. This persistence of the hypertonus in one or other muscle is a most important and constant symptom of lumbago as well as other forms of muscular fibrositis.

Being, as it is, the direct measure of the irritability of the muscle, it presents infinite grades of severity; the more acute the case, the more intense the hypertonus.

Its chief importance lies in the fact that it outlasts the subjective symptoms, and as long as it is in evidence it may safely be assumed that the acute process has not really disappeared, but has merely assumed a latent form.

Nodules or indurations are impossible of appreciation during the acute stages, consequently their consideration will be deferred to the section on chronic lumbago, the variety in which they are more frequently to be found.

Course of Disease and Complications.

Lumbago—at any rate in its more acute forms—is essentially transitory, and the acute pain which characterizes its onset tends gradually to diminish.

The sharper the attack, the shorter as a rule is its duration, this rarely exceeding eight or ten days, when the subject finds himself able to move more and more freely.

The milder forms are more likely to linger on, and it is not unusual for a man to find himself saddled, especially in the springtime, for a month or more with what may be termed " threatenings " or " twinges " of lumbago.

In these examples, as well as during recovery from the more acute forms, there is a pronounced liability to relapses or exacerbations.

Where the course of convalescence is interrupted by such recrudescence of pain, the loin should always be examined for the presence of *infiltrations or nodules.* For when such have become established the condition is often rebellious to treatment, and is but too apt to pass into a chronic form.

The most common complication of lumbago is *sciatica*, and it is the direct outcome of the extension of the morbid process from the fibrous tissues of the lumbar muscles to the sheath of the sciatic nerve.

In some instances it travels even farther, and actually invades the interstitial tissues of the nerve itself, giving rise to sciatic neuritis.

Sciatica or sciatic neuritis more commonly follows those types of lumbago in which the mischief is located in the tendinous structures covering the back of the sacral region, from whence it apparently spreads along the fasciæ to the nerve sheath.

Though the pain in lumbago is bilateral, it is often more severe on one side, and it is generally on that side on which it predominates that extension to the sciatic sheath occurs.

A very much rarer condition—*endocarditis*—is occasionally met with, not only in the acute febrile types of lumbago, but also in the milder forms.

General Diagnosis.

Common disorders, especially if of largely subjective character and devoid of dangerous sequels, lend themselves but too readily to precipitate diagnosis.

Especially true is this of lumbago, a minor ailment which even few laymen feel themselves incompetent to recognize.

Albeit the cardinal and often the sole symptom of the affection—*pain in the loins*—is one common to many morbid processes, whose differentiation from lumbago is often a matter of considerable difficulty.

Moreover, as the mistakes likely to occur in regard of acute lumbago are generally serious, it may not be out of place if we indicate the manner in which these cases should be approached.

In this, as in all other maladies, the first thing that arrests the attention is the *sex* of the individual. Now, despite the cynical observation that women may be divided into two groups —those with " backaches " and those without—this particular " backache "—acute lumbago—is singularly rare in the weaker sex, and its diagnosis, therefore, in their case should not be undertaken lightly. This observation made, we should inquire as to the *mode of onset*—whether classically sudden or insidious—as in the latter instance we may be dealing with an acute exacerbation arising in the course of chronic lumbago, a differentiation important from the view of prognosis.

The *exciting* or *determining* causes should be ascertained, whether due to exposure, damp, or some sudden movement, or the maintenance of some forced attitude.

Unless there be conclusive evidence of some violent strain or injury, we should not be too ready to assign the condition to trauma, especially if there is a question of "compensation" involved.

Is the attack a *primary* one, or has the patient suffered from similar seizures, or, equally pertinent, some other type of fibrositis, such as brachial or sciatic neuralgia? If so, we are almost surely dealing with a *gouty* or so-called "rheumatic" diathesis.

The former is far more likely in the case of lumbago, and the detection of tophi or the history of an attack in the toe-joint should clinch our premise as to its nature.

A previous history of influenza, sore throat, or gastric disturbance in others may be all that can be elicited; but rarely indeed will there be a total absence of some indication of functional derangement.

Having gleaned all the foregoing from the personal history, we should now determine the degree of constitutional disturbance, if any.

If *fever* be present, it does not necessarily exclude lumbago; but it does suggest the possibility that we may be confronted by one of those infectious disorders whose onset is attended by severe lumbar pain. The unusual degree of constitutional disturbance, headache, vomiting, anorexia, etc., should suffice to indicate that we are not at any rate dealing with a case of simple lumbago. This point being settled, we can proceed to analyze the more intimate features of the pain.

Is it constant or intermittent, spontaneous or only evoked by movement? and, if so, what particular movement leads to its production or aggravation, and, also, what is the pose of greatest ease?

If *spontaneous, and not increased by movement*, the case is probably not one of muscular lumbago. For in the latter the pain is always aggravated by active movement, though it remains unaltered by passive exercise of the affected muscles.

If the pain remains the same during active and passive movement, the mischief is probably seated in the joints of the lumbar column. Albeit this does not exclude the case being one of acute lumbago, for, as before noted, in some instances the fibrous elements of the *joints* rather than those of the muscles seem predominantly affected.

The *posture* in which the subject finds the greatest ease may also tell us something. Thus, in acute lumbago lying flat on the back is usually the most comfortable position; but if his pain is aggravated thereby, and he lies preferably on his side, this should give us pause; for in one of the commonest forms of traumatic lumbago—viz., that due to *strain of the sacro-iliac ligaments* on one or other side—the patient prefers to lie on his unaffected side, as when flat on his back his lumbar curve gradually becomes obliterated, and more strain is thrown on the damaged joint and his pain increased.

So much for the subjective side of the affection, and the next point to ascertain is the *site of the pain*, for which purpose the patient must be stripped.

It should be accurately noted, for sometimes it will be found in the *lower dorsal* rather than in the lumbar or sacral regions, which will, of course, suggest other causes, such as constipation, with a loaded transverse colon.

If in the loins, it should be noted whether it is located in the sacro-lumbar muscles or their attachments to the iliac crest and sacrum, and whether *bilateral or unilateral*, as in the latter event the cause is almost certainly trauma. Especially careful should we be on this point, if the seat of pain is referred to the region of the sacro-iliac joints.

Suspicion of such a traumatic origin would be confirmed by the presence of lateral inclination of the column to one or other side, as such is rare in simple lumbago, though the subject may lean forwards.

The site where the pain is complained of should be carefully and frequently palpated, and the presence of swelling or increased tonicity in the muscles should be noted.

At the same time any areas showing increased sensitiveness to pressure or any doughiness in consistency, either in the muscles or their tendinous attachments, should not be overlooked.

The detection of *nodules or infiltrations* will not be possible until the subsidence of the acute symptoms, unless there have been previous attacks of the same nature. If so, the skin, subcutaneous tissues, lumbar muscles, and aponeuroses should all be carefully and repeatedly examined for their presence.

Fortunately, acute lumbago is a very ephemeral malady, the lapse of a few days usually disposing of any doubts that may be entertained as to its nature.

We have dealt somewhat lengthily with the diagnosis of acute lumbago, as, when mistakes occur in this direction, they are usually grave, and largely due to the reprehensible habit of arriving at the diagnosis too hastily, instead of by the laborious, but more certain, method of exclusion.

We shall now indicate the salient features of the disorder, and afterwards its differential diagnosis from other maladies, general or local, characterized by acute pain of sudden onset in the lumbar or sacral regions.

Acute Lumbago.

Age and Sex.—Adults are most frequently attacked, usually middle-aged persons, and almost invariably males.

Onset.—The primary attack is sudden, but later seizures are more gradual.

Exciting Causes.—The chief are damp, muscular effort, strained attitudes, or dietetic indiscretions.

General Symptoms.—These may be absent, but there is often slight fever, with gastric derangement, highly acid urine, and uratic deposits or oxalates.

Local Symptoms.—Sudden and intense pain in lumbar or sacral region of *bilateral* distribution is complained of. It does not extend upwards or towards the flank and abdomen, but often in later stages radiates down the course of the sciatic nerve. It is aggravated by *active*, but not by passive movements.

Objective Signs.—The muscles are tender to pressure, and unduly tense, especially the ilio-costalis. Local foci of inflammatory œdema are present, and later infiltrations.

Skiagraphy.—This is negative.

Duration of Disorder.—This is from eight to ten days.

Complications and Sequelæ.—Of the former, endocarditis is sometimes met with, and as a sequel sciatica is most common.

Collateral Features.—Generally evidences of ancestral or acquired gout, or a history or coincident existence of fibrositis in other regions—viz., sciatica, deltoid fibrositis, brachialgia, etc.—are to be elicited.

Differential Diagnosis.

The chief sources of error are traumatic lumbago of recent occurrence, the lumbar pains of specific infectious disorders, lumbo-abdominal neuralgias, and, as rarities, acute lumbar and sacral osteomyelitis.

Traumatic Lumbago—Strain or Rupture of Muscles.

Sex and Occupation.—Those affected are usually males who are engaged in arduous occupations.

Onset is immediate after direct or indirect injury.

Pain.—This is intense, and usually wholly disabling. The site of pain is strictly *localized* and *unilateral*, often near the iliac crest. In strain or *partial* rupture it is aggravated by contraction or passive *extension* of injured muscle. If rupture be *complete*, pain is relatively slight, but loss of power is absolute.

Tenderness.—This is not diffuse, as in simple lumbago, but always *localized* to the site of the lesion.

Objective Signs.—Occasionally swelling, effusion, and ecchymosis, at the site of the injury, with an appreciable gap between the torn ends of the muscles, are to be met with. Lateral deviation of lumbar column is not uncommon.

Skiagraphy.—This is negative.

Duration of Disorder.—This is from four to six weeks.

Complication.—Hæmaturia from bruising of kidney is sometimes a feature.

Strain of Sacro-Iliac Ligaments.

Onset.—This is immediate after injury.

Pain.—This is unilateral, and is situated over the synchondrosis, and later, if there be effusion into the joint, referred pain along the sciatic nerve is present. Unlike lumbago, it is aggravated by lying on the back and by straight-leg extension.

Objective Signs.—Local tenderness is found, and sometimes swelling. There is lateral deviation of the lumbar column to the affected side, with limitation of lateral inclination away from injured joint. If the condition is the result of severe injury, preternatural mobility may be present; but all movements are painless if the pelvic girdle be fixed.

Specific Infectious Disorders.

The onset of some of these affections is associated with severe lumbar pain—viz., smallpox, spinal meningitis, etc.

Careful observation will suffice to obviate such grave errors, and in any case the *severity of the general symptoms* should arrest attention. One local infectious disorder alone calls for mention in this connection—viz.,

Herpes Zoster.

Sex.—Unlike lumbago, males and females are equally liable.

Age.—Children and old people are affected rather than middle-aged persons.

Pain.—This is usually unilateral and radiates along the course of the affected nerve.

Eruption.—This appears within a few hours or days of onset.

Lumbo-Abdominal Neuralgia.

This affection is usually symptomatic of pelvic and abdominal disorders.

Pain.—This is unilateral and spontaneous, but more lancinating than in lumbago. It radiates from the lumbar region laterally to the lower abdomen, flank, and hypogastrium. Points douloureux are to be found generally over the lumbar spine and a little above the middle of the iliac crest.

Acute Lumbar Osteomyelitis.

Though rare, an instance was brought to our notice in which this serious disorder was at its onset mistaken for acute lumbago. While in the example referred to there was severe pain in the lumbar region, the local symptoms may be so slight as to be wholly masked by the constitutional disturbance, which is usually very marked. The cases hitherto reported are so few that it is difficult to indicate the exact lines of diagnosis; but it is well to bear in mind that, given intense or slight pain in the lumbar region, with signs of grave illness, this may be the underlying lesion.

Such cases not uncommonly terminate in death within a few days of their onset, as happened, indeed, in the particular instance communicated to us by Dr. Leckie.

Osteomyelitis of Sacrum.

Gaudier and Bertein have recently drawn attention to this somewhat similar affection, and the possibility of its confusion with acute lumbago seems only too likely. They claim that the lesion has certain peculiarities differentiating it from other acute vertebral inflammations.

Etiologically, trauma seems to play a large part in its production, and it is characterized by a fulminant onset and marked symptoms of septic intoxication, but cord complications are exceptionally rare.

The disease runs a rapid and often fatal course, with abscess formation, the pus usually extending backwards, but sometimes towards the rectum or sciatic foramen. The chief danger of confusion lies in the swift course pursued by these infections of the vertebral marrow, as there is no time for revision of a mistaken diagnosis. In such cases, if doubt be present, exploratory lumbar puncture and bacteriological examination of the fluid obtained should be resorted to without delay.

CHAPTER XVI

CHRONIC LUMBAGO

Synonyms: Chronic lumbar fibrositis; rheumatism of the lumbar muscles; lumbodynia.

The disorder is the outcome of a chronic inflammatory hyperplasia of the fibrous tissues of the muscular and aponeurotic layers of the lumbo-sacral region.

The *etiology* of this variety is similar to that of the acute form. It may either be the sequel of an acute attack, or, developing in an insidious manner, it may pursue a subacute or chronic course from first to last.

The dividing-line between the acute and chronic form is not sharply defined, for in most examples of the latter acute exacerbations occur from time to time under the influence of the various causes.

Clinical Account.

The salient symptoms are those of pain, aching, and stiffness in the sacro-lumbar masses or their tendinous attachments. The degree of their severity will vary according to the extent to which nodules or infiltrations have developed in the affected tissues. The more extensive they are, the more persistent will be the aching and stiffness, and the greater the likelihood of exacerbations or relapses occurring upon the slightest pretext.

During exacerbations the features of an acute attack are almost exactly reproduced, but with this difference: after a primary acute attack complete resolution often occurs, and a permanent, or at any rate a long-continued, freedom from pain ensues.

As opposed to this, in the chronic forms, even during the interval between relapses, there persists a greater or less degree of aching and stiffness, or oftentimes a wearisome feeling of weakness or fatigue in the back.

Perhaps the most distinctive feature of this form, when well established, is the ease and frequency with which the most trivial causes—a slight chill, a strained attitude, or unusual movement—

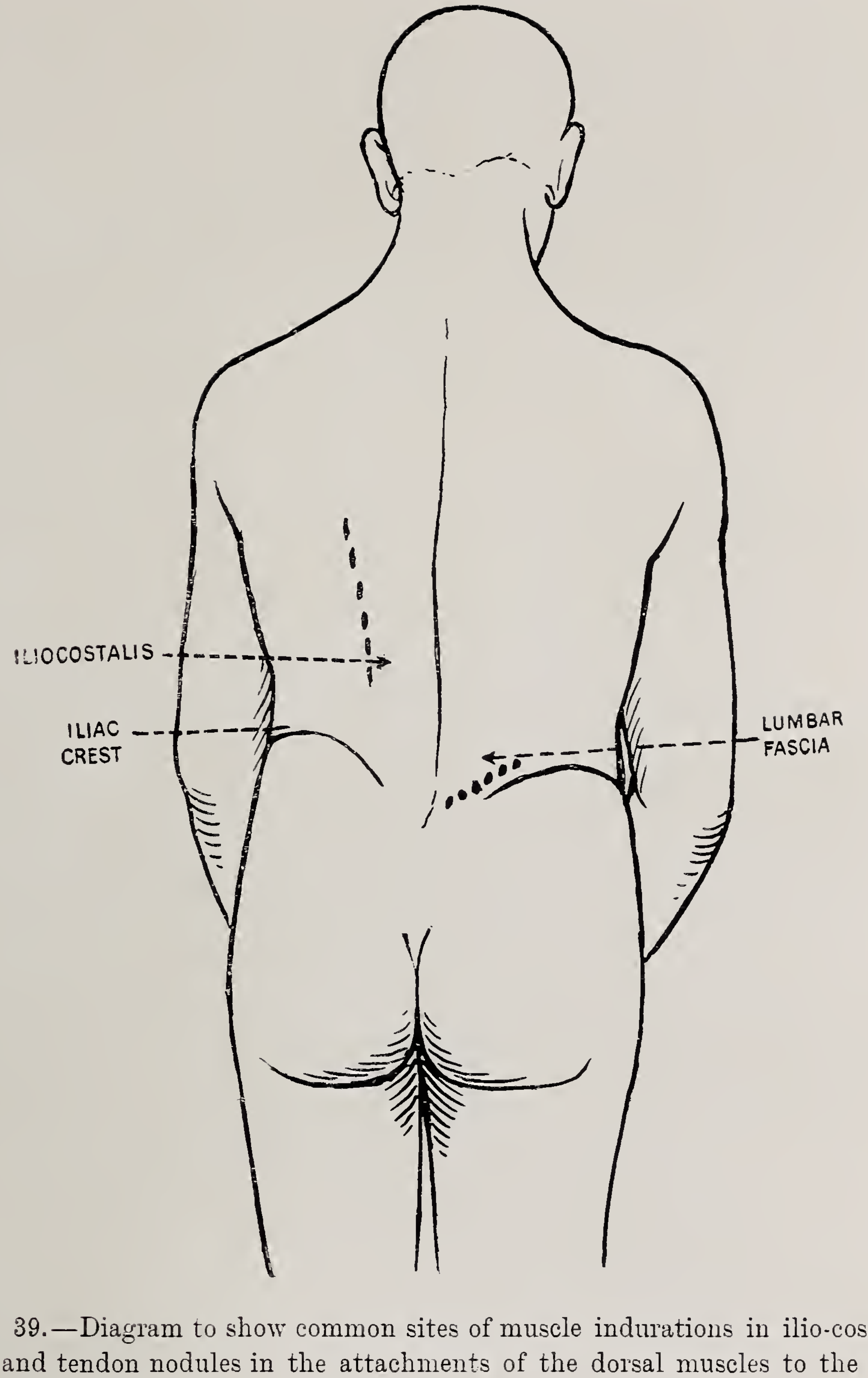


Fig. 39.—Diagram to show common sites of muscle indurations in ilio-costalis and tendon nodules in the attachments of the dorsal muscles to the iliac crest and sacrum.

To face page 244.

initiate a degree of suffering whose intensity is quite disproportionate to the exciting cause.

This swiftness of response, as in other varieties of muscular fibrositis, is attributable to the persistence of a varying degree of hypertonus in the affected muscles.

This hypertonicity is, of course, an expression of the more or less persistent irritability of the implicated muscles, and to this is to be ascribed the painful stiffness that accompanies or follows muscular exertion.

Presumably the hypertonic lumbar muscles, if subjected to sudden or prolonged effort, respond by an increase in their tonicity, and the same result follows the ingestion of toxic irritants, such as alcohol, or excessive or unsuitable articles of diet.

The local sweating or hyperidrosis of the loins so commonly present is a fertile cause of relapses through oft-recurring chills of the overlying skin surface.

Lastly, "chronic lumbago" is either associated or often alternates with deltoid, intercostal, and other types of fibrositis.

Objective Phenomena.

In all chronic cases careful palpation will determine the presence of nodules or infiltrations in the muscles or their tendinous attachments.

Muscle Indurations.—These are situated most commonly in the quadratus lumborum and the components of the erector spinæ, especially the ilio-costalis, but they are not infrequently situated in the lumbar aponeuroses.

Their presence should always be suspected in any patient complaining of oft-recurring attacks of lumbago. It is only in cases with very extensive infiltrations or numerous nodules that pain and stiffness are complained of constantly.

One important point deserves emphasis, and that is the strikingly uniform manner in which recurring attacks of pain always originate at one particular spot, where during the quiescent periods a nodule or infiltration can be detected by palpation.

In very severe or inveterate cases we may be confronted by a diffuse fibrositis, involving not only the muscles and aponeuroses, but also the skin and subcutaneous tissues of the loin.

Such a condition, though it may affect both sides, usually predominates on one and leads to an ill-defined projection of the affected area.

Palpation shows great thickening and induration of the implicated structures, the superimposed skin being firmly tied down and showing great loss of resilience.

Increased pigmentation may be present, with reduced tactile sensibility and absence or diminution of the reaction of the skin to faradic stimulation.

Tendon Nodules.—These in lumbago are usually to be found, in our experience, in the tendinous attachments of the sacrospinalis and other dorsal muscles inserted into the iliac crest. Or they may be situated at the site of attachment of the digitations of the ilio-costalis to the lower ribs.

In the former situation we have found the following plan of use to facilitate their detection:

The patient lying prone on a bed, with his muscles as lax as possible, the thigh should be abducted and hyperextended so as to relax the gluteus maximus and the related fasciæ.

This is preferably done by an assistant, and then the physician, on palpation of the iliac crest or immediately below, will find, on passing his fingers gently and firmly over the bony surface, a series of multiple nodules of extreme hardness and exquisite sensibility.

The Course of the Disease is essentially chronic, and presents the aspect of a series of acute exacerbations linked together by a variable degree of aching and stiffness.

Only where the fibrous hyperplasias are strictly localized can they be satisfactorily dealt with by massage, and if their dispersal cannot be achieved by this or other means, an indefinite prolongation of the symptoms almost invariably occurs.

Our prognosis, therefore, should always be guarded as to the prospect of cure in the presence of any foci of organized character.

General Diagnosis.

In approaching this difficult problem, it is well to reflect that between the skin and lumbar column are interposed many fascial and muscular layers; and while the morbid process may have its site in any one of these structures, it may haply lie deeper still—in the column, the cord itself, or its membrane.

Nor may we stop here, for the lumbar pain may be a *referred* one due to disease of some viscus, to pressure by an aneurysm, or to the extension backwards of some retroperitoneal growth or inflammatory process. In the presence of such numerous pitfalls it is clear that *systematic examination* is our only safeguard against error, as into the diagnosis of chronic lumbago many sources of fallacy enter which do not concern the acute form.

Analysis of History.—The onset, course, and duration of the disorder must be elicited, and the personal and family history scanned for gouty or " rheumatic " tendencies.

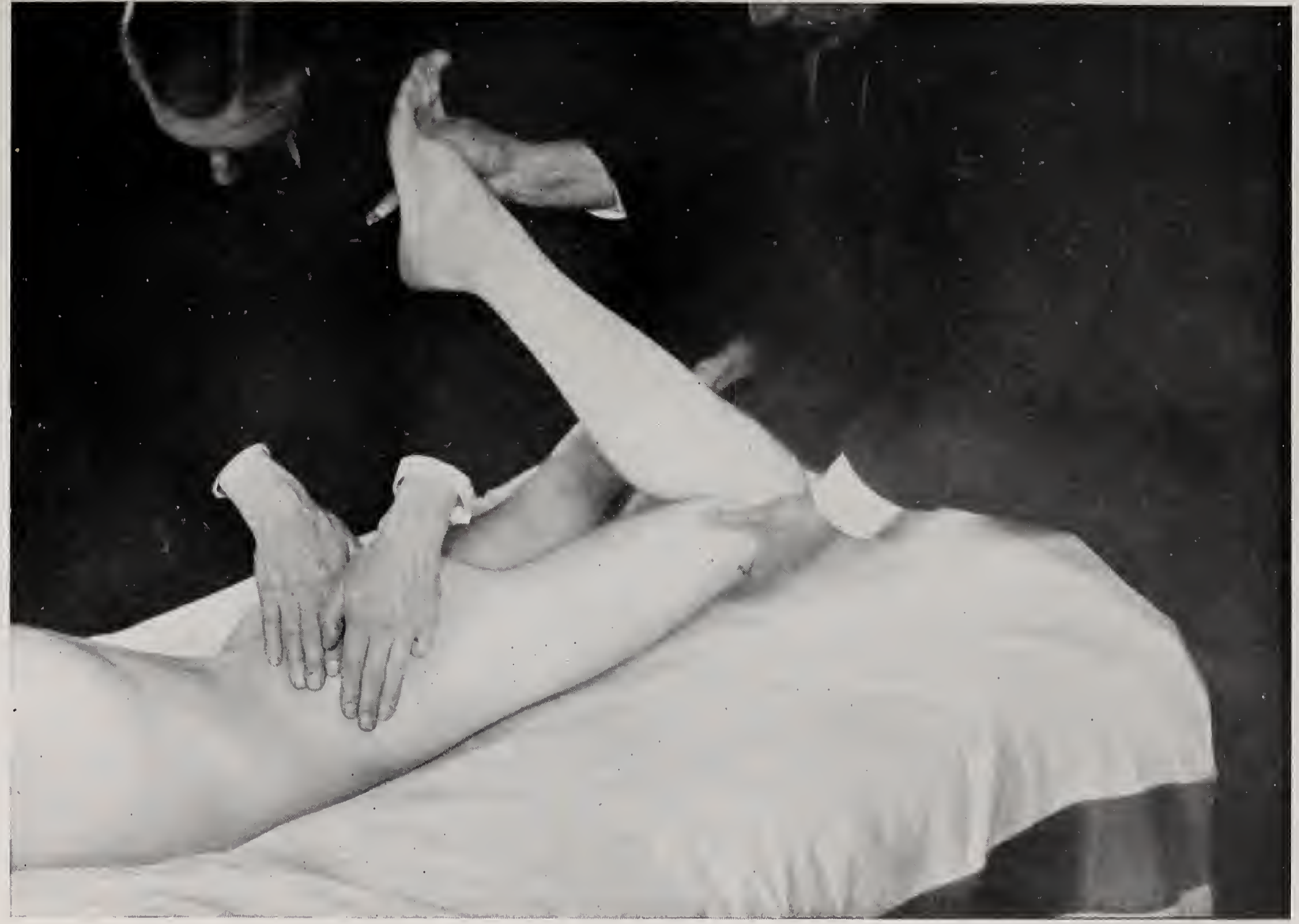


Fig. 40.—This plate shows the arrangement of patient most suitable for the palpation of tendon nodules in chronic lumbago.

To face page 246.

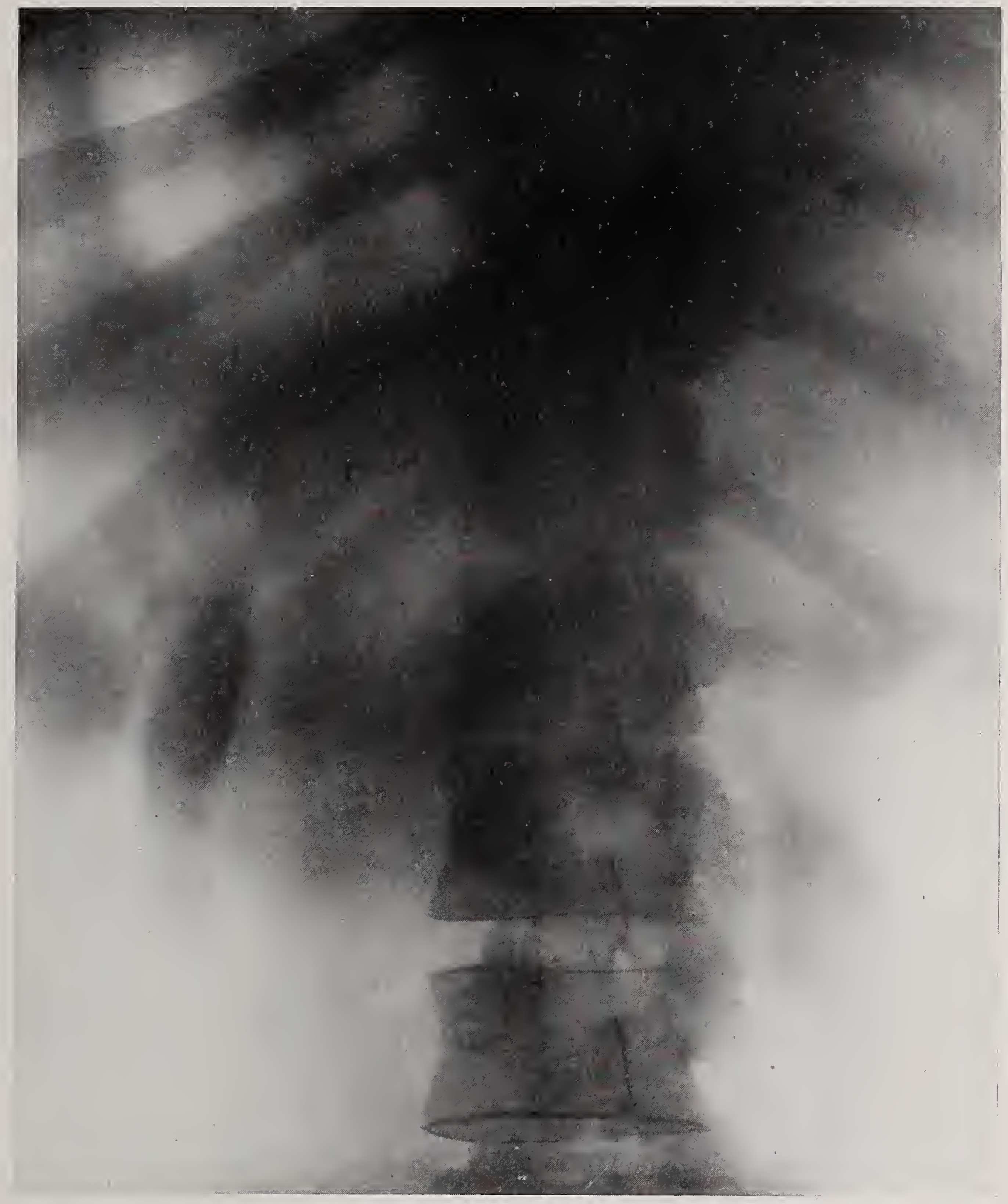


FIG. 41.—Skiagram of a case of renal calculus.

To face page 246.

In men the question of *trauma* as well as *gonorrhœa* should be gone into, as even, though remote, they may furnish a clue to the cause of the pain.

In women acute lumbago is rare, but not so chronic lumbago—using the term in its broader sense as indicating chronic lumbar or lumbo-sacral pain—such being very common. In females, therefore, we should inquire as to the occurrence of a recent confinement, and whether the pain is aggravated at the menstrual period. Affirmative answers on these points would suggest, not lumbago, but possibly sacro-iliac relaxation or intrapelvic disorder.

Physical Examination.

Inspection.—It is well in the first place to glance at the general pose, as improper postures or attitudes are a common cause of "backache." Is the subject round-shouldered, with a sagging abdomen and pronounced lumbar curve ? If so, his pain is probably static in origin. Or has he flat feet or legs of unequal length—say shortening through malunited fracture ? Or, if a woman, does she wear high-heeled shoes ? If such causes of disturbed balance are present, we should beware of committing ourselves to a diagnosis of simple lumbago.

Site of Pain.—If referred to the *lower dorsal region*, the following sources of fallacy should be recalled to mind:

Fæcal impaction in the transverse colon is often confounded with lumbago, and not seldom in our experience oxaluria, not to mention renal calculus, all of which may have as an outstanding symptom "backache."

If referred to the *sacral region*, hæmorrhoids, prostatic enlargement, or rectal growths may be responsible. In women some intrapelvic disorder, or, if recently confined, a relaxed state of the sacro-iliac ligaments, may be the originating cause.

Distribution of Pain.—Is it uni- or bi-lateral ?

In lumbago it is always the latter, and if unilateral it is usually traceable to injury—a traumatic lumbago—or more rarely it may be an early symptom of a growth involving the nerve roots. The latter is more likely, if the pain, intead of being fixed, *radiates from the loin to the flank and lower abdominal wall.* Such a lumbo-abdominal neuralgia may or may not be symptomatic of lumbar caries, meningeal growths, or even disease of the cord itself.

The foregoing pitfalls sufficiently show the inadvisability of basing a diagnosis of lumbago simply on the site of the pain, whether lumbar or sacral.

Swelling or *redness* in the loin is incompatible with lumbago, but is suggestive of more serious conditions, such as perinephric abscess, etc.

Wasting of the muscles, too, is very unusual in chronic lumbago, but very common in traumatic types of the disorder.

Static Alterations.—Such are usually absent in chronic lumbago, and therefore any exaggeration or decrease of normal lordosis should arrest attention.

For flattening of the lumbar curve may be indicative of lumbar caries, and such obliteration is also common in sacro-iliac relaxation, whether following pregnancy or trauma.

The opposite condition, exaggerated lordosis with chronic backache, is frequent in obese persons or the subjects of abdominal tumour.

Lateral deviation of the lumbar spine, if present, will be against lumbago, though a common feature of *traumatic* lumbago, and, of course, is not uncommonly traceable to shortening or other static deformity in one of the lower extremities.

Palpation.—Great care should be taken not to overlook the presence of *nodules or diffuse thickening* in the subcutaneous, aponeurotic, and muscular layers of the loin. Such, in the absence of any history of trauma, will be direct evidence in favour of chronic lumbar fibrositis or lumbago.

If such infiltrations be absent, some help may be gained by ascertaining whether palpation is associated with tenderness or not on firm pressure. If there be no tenderness to deep pressure, but *hyperæsthesia of the skin* over the same area, it is probably of the nature of a *referred pain*, whose cause must be sought elsewhere.

Coincidently, any *muscular spasm or rigidity*, such as stiffness of the spine during walking or during the performance of passive manipulations, should be noted. Such spasmodic contraction of the muscles is rarely of high degree in chronic lumbago, save during exacerbations, and, in any case, deep-seated disease in the column should be excluded as the cause thereof.

Investigation of Mobility.—The pelvis being firmly fixed, the mobility of the spine in every direction, including lateral flexion, should be ascertained.

In chronic lumbago, save during exacerbations, there is no actual limitation of movement of the column.

In forward flexion it should be noted whether the normal lumbar lordosis is replaced by the usual arched kyphosis with normal projection of the lumbar spines.

In extreme bending forwards it should be observed whether the normal sequence of lumbar flexion, followed by flexion of the hip-joints, takes place, or whether it is reversed.

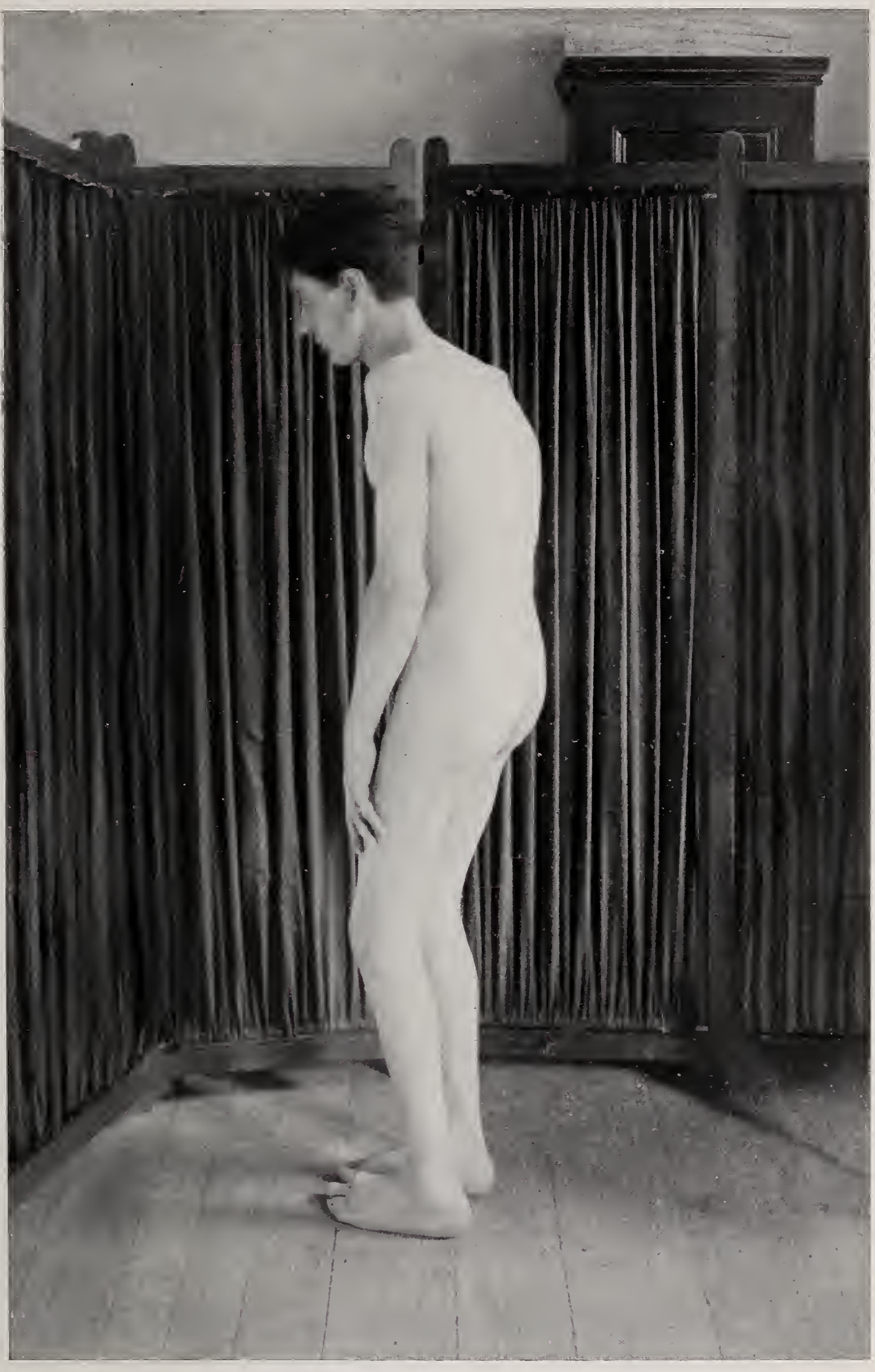


FIG. 42.—Spondylose rhizomelique, or atrophic spondylitis.

To face page 248.

Any abnormalities in *lateral flexion*, as well as undue rigidity of the lumbar column in its lower segments, should be noted.

Such disorders of mobility are almost unknown in simple chronic lumbago, though they are common features of the traumatic type.

Farther than this we cannot go without the aid of *skiagraphy*, for these same signs are also to be met with in tuberculous and non-tuberculous forms of lumbar spondylitis.

Presuming that our search for the cause of any chronic lumbar pain has not been elucidated by the foregoing procedures, we must not forget that frequently even more serious conditions, such as *chronic disease of the spinal cord* or its membranes, may masquerade under the guise of lumbago.

Consequently one must not omit to test the *response* of the *knee-jerks* and other reflexes of the lower extremities, nor is it wise to confine our attention entirely to the dorsal region of the body, lest we overlook some abdominal or intrapelvic growth.

Examination of Urine.—This should invariably be undertaken in all cases, having regard to the frequency with which disorders of the renal organs are accompanied by lumbar pain. The excretion should especially be examined for the presence of excess of urates or *oxalates*.

In conclusion, we should not have ventured upon so detailed a consideration of the diagnosis were it not that a somewhat extensive experience has clearly shown us that the pitfalls indicated are by no means theoretical ones, but are amongst the most common encountered in daily practice.

It now remains for us to indicate briefly the salient features of simple chronic lumbago, and subsequently to proceed with its differential diagnosis.

Simple Chronic Lumbago.

History.—This discloses an absence of trauma, but often reveals the occurrence of previous attacks of lumbar pain, sciatica, or other types of localized fibrositis.

Exciting Causes.—The disorder is often attributable to slight chills, unusual attitudes or movements, or ingestion of intoxicating irritants, alcohol, etc.

Onset.—It may develop out of an acute attack, or arise gradually, with exacerbations.

Pain.—This is nearly always bilateral, though exacerbations may commence with pain at the site of a nodule.

Site of Nodules.—These are most common in the quadratus lumborum and ilio-costalis. Tendon nodules are situate usually at the attachments of the ilio-costalis to the six lower ribs, or at their insertions into iliac crest and sacrum. In long-standing cases there is great thickening and induration of muscles and fasciæ, with diminished elasticity of the superimposed skin.

Static Alterations.—These are absent, and the lumbar curve is normal.

Mobility.—Though stiff and painful on movement, there is no actual limitation of range, and the lumbar column is freely movable passively.

Skiagraphy.—This is negative.

Differential Diagnosis.

The chief disorders to be differentiated are traumatic lumbago of long standing, backaches of "static" origin, referred pains of visceral disorders, and diseases of the lumbar column.

Traumatic Lumbago.

Sex.—Males following arduous occupations are affected.

Onset.—This is immediate after injury, direct or indirect.

Pain.—This is always unilateral.

Muscular Atrophy.—This is common and of unilateral distribution.

Static Abnormalities.—These are frequent—either lateral deviation or increase or decrease of lordosis.

Mobility.—On forward flexion, there is persistence of lordosis and absence of normal projection of lumbar spines. Flexion at hips frequently precedes bending of lumbar column, thus reversing the normal sequence. Lateral flexion to one or other side is limited, and because of rigidity of the lower lumbar segments the inclination to one or other side begins at a higher level than normal (*vide* section on traumatic lumbago).

Static Lumbago.

Sex.—This affection is slightly more common in women.

Onset.—This is always gradual and insidious.

Causal Static Factors.—The most common are flat feet, and more rarely inequality in the length of the legs, suddenly developed obesity, recent pregnancy, or improper foot-gear.

Exciting Causes.—These are usually prolonged walking, standing, carrying, or some debilitating illness leading to loss of tone.

Pain.—This is commonly located in the sacral region, often over the sacro-iliac joints. It radiates down the sciatic nerve, and is aggravated by straight-leg extension. There is difficulty in getting up after resting or sitting, which passes off after a few

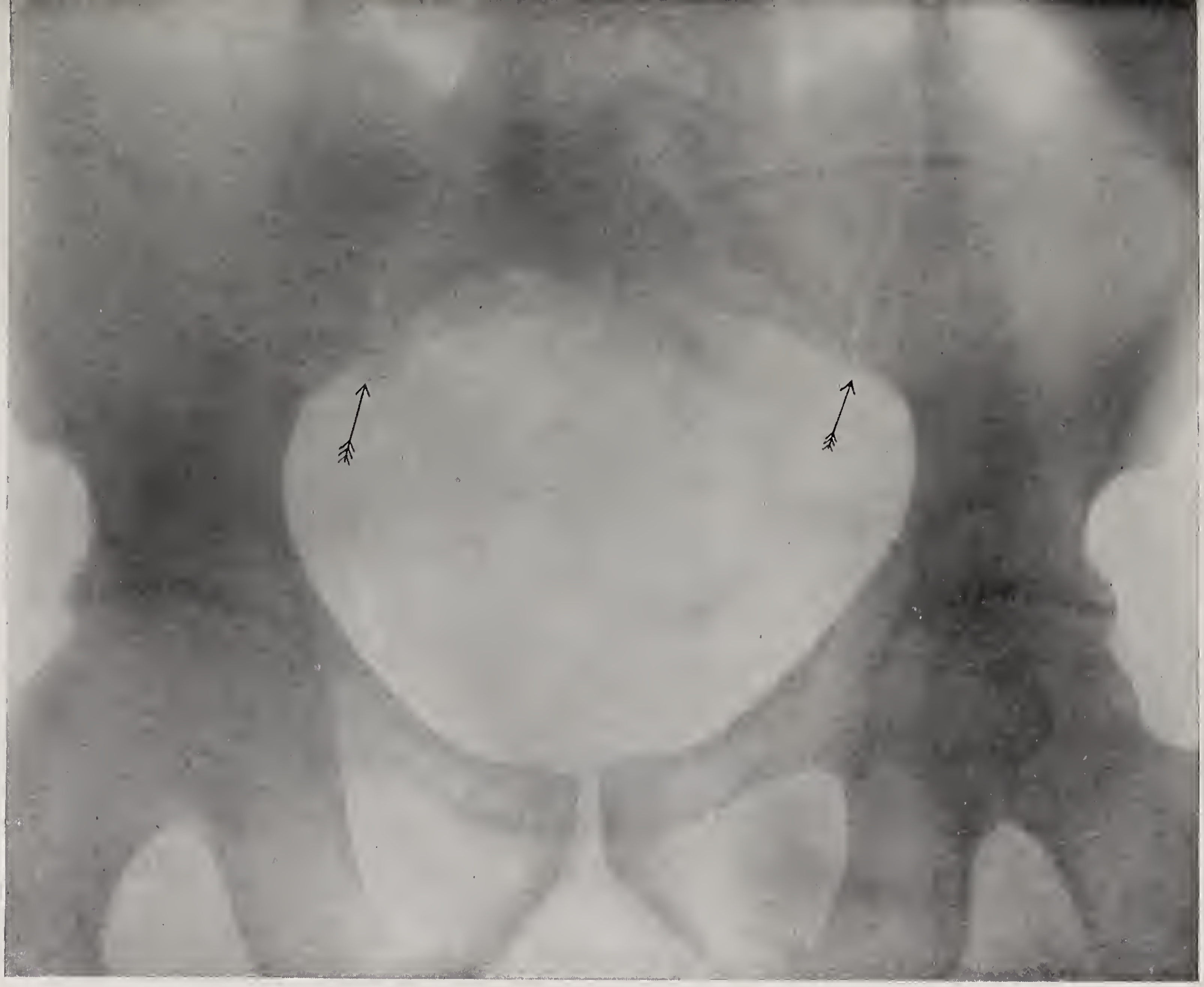


Fig. 43.—Skiagram of a case of symmetrical osteo-arthritis of sacro-iliac joint.

To face page 250.

steps, but returns again after standing or walking for any length of time. Pain is relieved after correction of the static deformity, reduction of body-weight, and restoration of normal balance.

Backache of Constipation.

Pain.—This is usually at a higher level than in lumbago, extending in a transverse line about halfway between the inferior angles of the scapulæ and the renal region. It may be attended with spurious diarrhœa, but the pain if due to retained fæces in the colon disappears after an aperient or enema.

Backache of Oxaluria.

The subjects usually are nervous, highly strung individuals. Mental depression is a marked feature, and the condition not uncommonly develops at a period of great intellectual strain. Microscopic demonstration of oxalates in the urine will clinch the diagnosis.

Bacteriuria.

In one instance of chronic lumbago that came under our care the urine teemed with *Bacillus coli communis*, and Dr. Hale White has recently drawn attention to this as the possible explanation of some instances of so-called chronic lumbago.

Renal Calculus.

Pain.—This is often unilateral and located in the angle between the last rib and margin of erector spinæ. If severe, it is not confined to the loin, but is referred also to the thigh, groin, or genital organs. It is well to remember that, not only lumbar pain, but considerable though *intermittent* rigidity of the lumbar column, may be a feature of renal and ureteral calculi, and even movable kidney (Bennett). Therefore in all cases of obscure backache bimanual palpation should never be omitted, as otherwise a too mobile kidney, or one enlarged by growth or a purulent collection, may be overlooked. Lastly, in all instances where the possibility of calculus is suspected, skiagraphy should be invoked to establish a diagnosis.

Backache from Pelvic Disorders in Women.

Pain.—This has no distinctive characteristics. It is usually felt at or near the top of the sacrum, and is generally worse before and during menstruation. Sometimes unilateral, it is not aggravated by definite movements, but by prolonged exertion. If due to disease of pelvic organs, other symptoms will be present. Physical examination will establish the nature of the disorder.

Lumbar Caries.

In its early stages this may be confused with lumbago. A flattened lumbar curve, with usually lateral deviation, is to be observed. Restricted lateral and antero-posterior movements of lumbar spine are a salient feature. Root pains, if present, radiate to the front of abdomen and loin. Owing to spasm of spinal muscles, the patient has a military gait. A tuberculous history may be elicited or the presence of *lesions in lungs* or *glands* detected, and, failing such, a positive tuberculin reaction.

Atrophic Arthritis of Spine.

This condition, otherwise known as the *spondylose rhizomélique* of Marie, in its early stages is often confounded with lumbago, as the disease usually begins in the dorso-lumbar area.

The disease is four to five times as common in men as in women, and usually the subjects are under forty years of age. The affected region of the spine is tender, with spasm or atrophy of the dorsal muscles. Any *limitation in movement of the hip or shoulder joints, when combined with spinal pain and rigidity,* should immediately arouse suspicion. This combination of central and peripheral joint involvement is almost diagnostic. Often the small joints of the hand are not implicated, and if affected they show all the characteristics of the atrophic or rheumatoid type of arthritis deformans.

Hypertrophic Arthritis of Lumbar Spine.

Stiffness and pain of the lumbar muscles of uni- or bi-lateral distribution may for long mask a slowly progressing lumbar osteoarthritis. The pain in initial stages is localized strictly to affected segments. Later referred pains in limbs or round the trunk, due to pressure on nerve roots by exostoses, are to be met with.

Flattening of the normal lumbar curve is sometimes present, and also marked rigidity, which is most easily detected during lateral flexion.

The presence of exostoses may be established by palpation, but skiagraphy is usually necessary for their detection.

Lastly, in any case presenting itself as one of "chronic lumbago," and in whom there are evidences of osteo-arthritis elsewhere, such as Heberden's nodosities, the mobility of this portion of the lumbar spine should be very carefully investigated, and resort had immediately to skiagraphy if its nature appears doubtful.

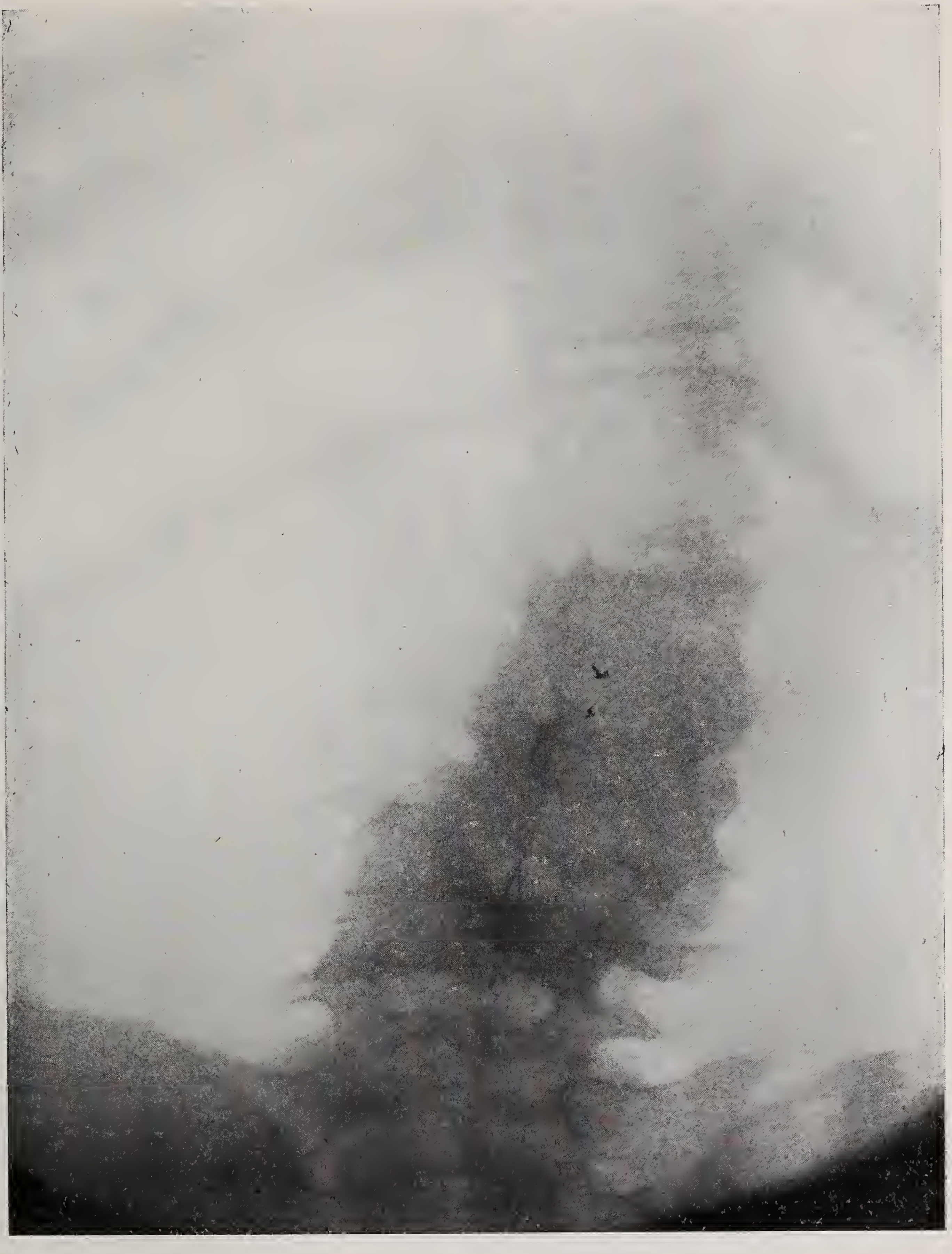


FIG. 44.—Skiagram of lumbar caries.

To face page 252.

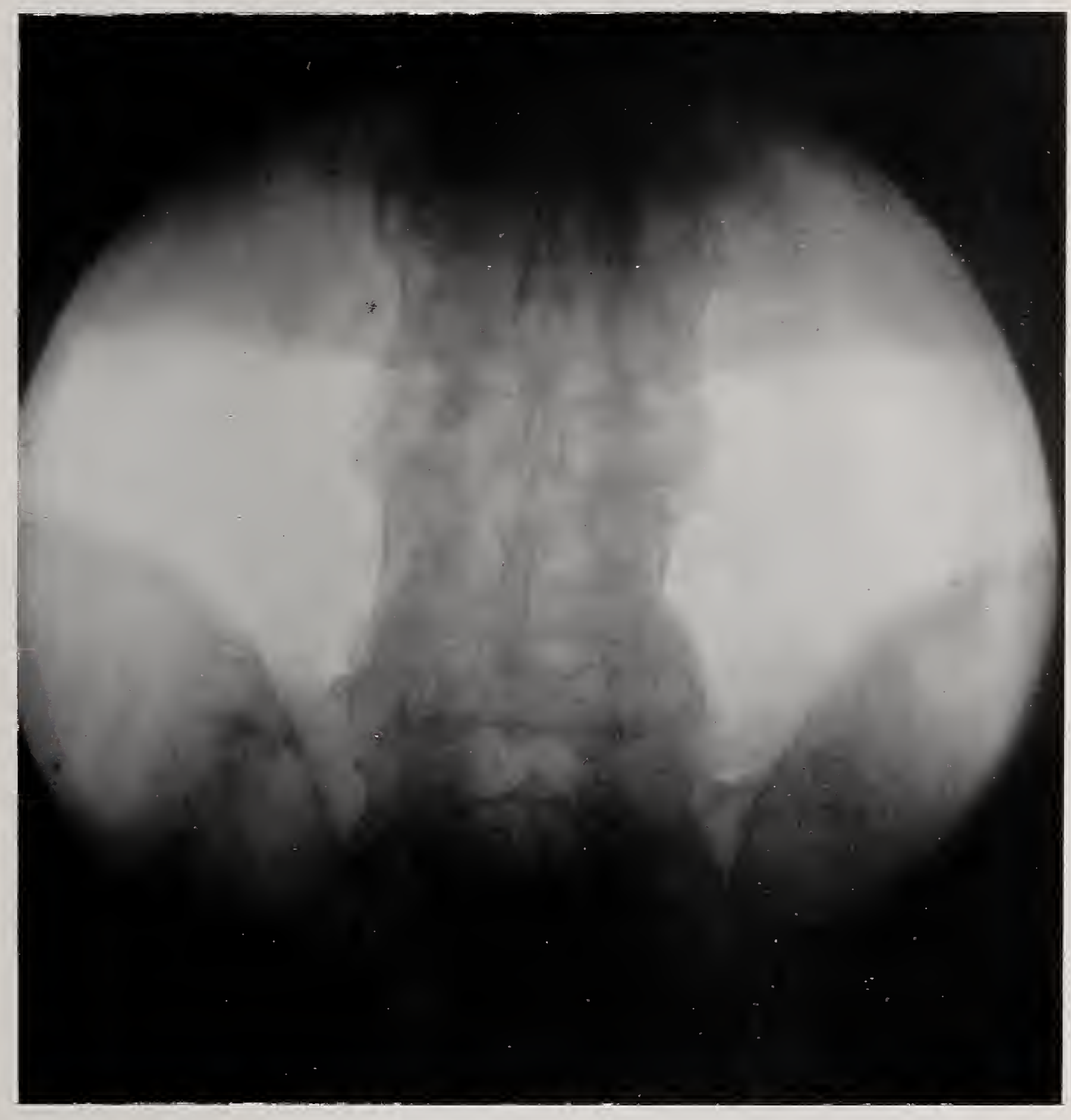


Fig. 45.—Skiagram of a case of lumbar spondylitis (atrophic type). Shows partial fusion of the individual segments.

To face page 252.

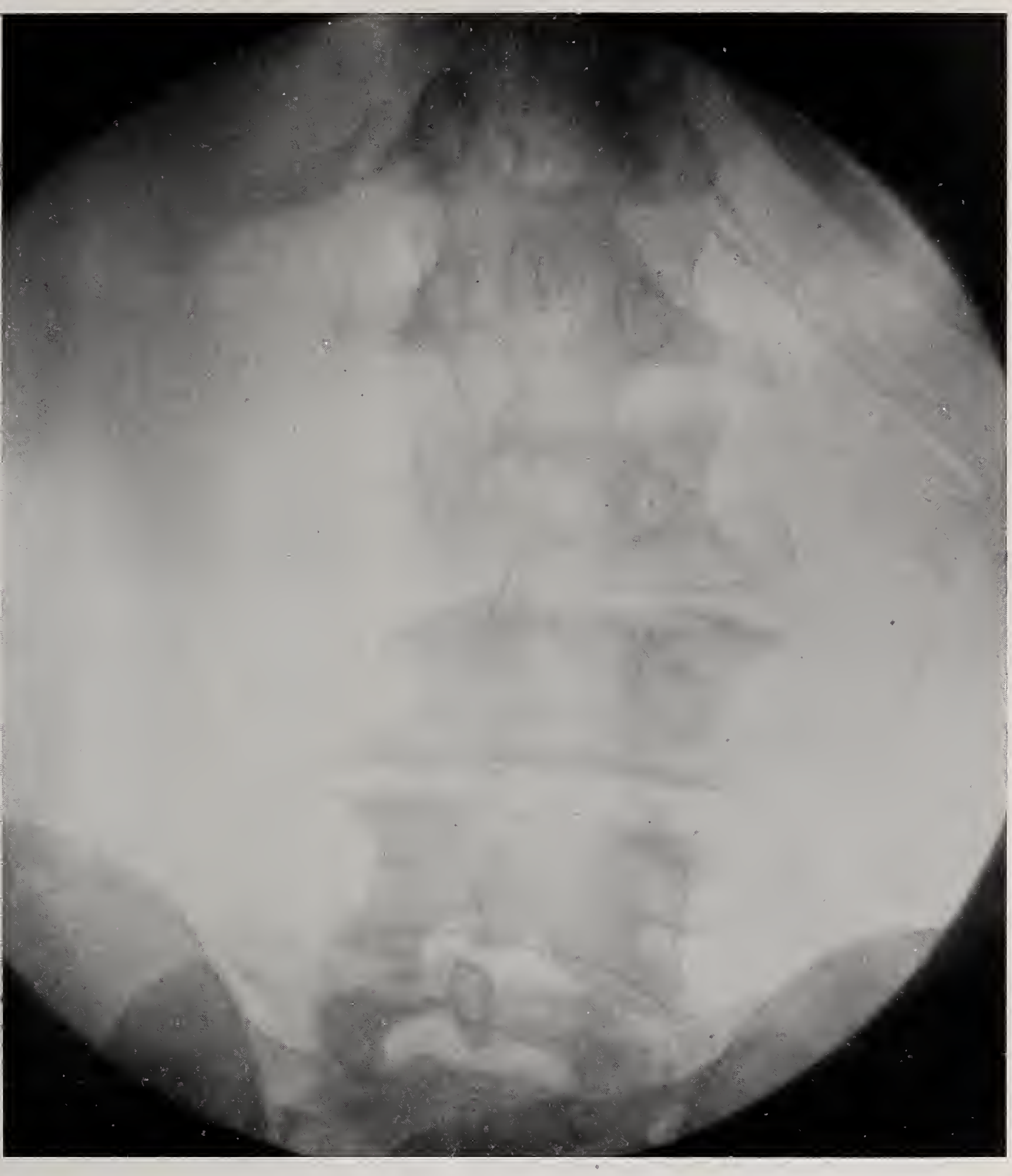


FIG. 46.—Skiagram of osteo-arthritis of lumbar spine, showing lipping and alteration of intervertebral spaces.

To face page 252.

Osteo-Arthritis of Sacro-Iliac Synchondrosis.

This affection should not be overlooked as a possible cause of "chronic lumbago." It is sometimes bilateral in distribution. Pain is severe, and generally aggravated by the recumbent position, owing to obliteration of the lumbar curve, with resulting increased strain on the sacro-iliac joint. It is intensified by all movements causing strain on the affected synchondrosis. Referred pains along sciatic, obturator, and gluteal nerves coexist.

We have known this condition confused with renal calculus and lumbago.

Malignant Disease of Lumbar Spine.

This affection is usually secondary to primary growth in the *breast*, *testicle*, *prostate*, or to sarcoma in the limbs.

It is well to be alive to the possibility, as sometimes patients withhold information regarding a previous operation.

We are reminded of the case of a middle-aged lady who was sent to one of us suffering from "chronic lumbago." She carefully refrained from all reference to an operation, but during the course of examination it was observed that her right breast had been removed. The pain was situated well above the ordinary site for lumbago, and predominated over the right lower dorsal area. More detailed examination revealed signs indicative of a secondary growth in the lung, to which she succumbed within a month of being seen.

Where the *spine* is the seat of the secondary growth, the symptoms are very similar to those of caries—*i.e.*, pseudoneuralgia, usually unilateral at first, eventually becoming bilateral through extension of the growth; and with this is associated muscular stiffness, paresis, and ultimately paraplegia.

In all doubtful cases skiagraphs taken from different standpoints should be resorted to.

Hyperæsthetic Spine.

This is generally met with in neurotic persons after accidents, or as a sequel to or accompaniment of neurasthenia. The onset of pain is commonly indefinite, and it usually radiates upwards along spine, but does not extend laterally.

The tenderness is generally exaggerated, but as a rule no real stiffness of the spine is present.

The pain is markedly under the influence of mental states—relieved by mental diversion, aggravated by worry.

As Stockman has pointed out, "weakness of the back, aching of the fascia lata, and the symptoms, which have been called 'spinal irritation,' are often due to fibrous indurations."

Consequently the lumbar muscles and aponeuroses should be carefully palpated before classing the condition as a *neurosis*.

Abdominal Aneurysm.

Cases are on record in which this condition has been confused with lumbago. The severity of the pain, its persistence and dull boring character should suggest the existence of a serious cause.

The possibility of aneurysm should be entertained in the presence of a history of syphilis, signs of widespread arterial degeneration, and the detection by palpation or skiagraphy of an expansile pulsatile tumour.

Lumbar Type of Intermittent Claudication.

Hunt has recently recorded in the *American Journal of Medical Science* a case of this nature. While instances of this affection in both upper and lower extremities have been described, we believe this to be the sole example recorded of its localization in the lumbar arteries.

The pain was situated in the lower part of the back, radiating, when severe, to the flanks, but not forward to the abdomen.

It was of intermittent character, and, though aggravated by movement of the trunk, it ceased during repose.

The possibility of its confusion with lumbago needs no emphasis, but the nature of the disease could only be established if skiagraphy revealed calcification of the arteries in this region.*

Traumatic Myositis Ossificans.

This rare condition sometimes affects the lumbar muscles.

In a case that came under our notice the original cause was a hunting casualty. The injury was followed by persistent pain and aching in the loins, which eventually radiated down the legs.

He consulted an eminent neurologist for what was considered to be "chronic lumbago."

The diagnosis was revised by this authority, who concluded that the condition, in view of a syphilitic history, was one of incipient tabes, under which depressing diagnosis he remained almost bedridden for some years.

Eventually a skiagraph revealed extensive osseous deposits in the lumbar muscles, which were undoubtedly the outcome of his injury, inasmuch as in his accident he had fallen backwards, his loins coming into violent contact with the top bar of a gate.

---

* This same observer has lately recorded further examples of this lumbar type of intermittent claudication.

CHAPTER XVII

PLEURODYNIA AND DORSODYNIA

Pleurodynia.

Synonyms: Intercostal fibrositis; rheumatism of the thoracic muscles.

Like other parts of the body, the parietes of the chest are liable to be attacked by so-called " muscular rheumatism," and, indeed, this intercostal variety is not only one of the most common, but also one of the most painful, forms of fibrositis.

Usually the intercostal muscles on one or other side are involved, but in some instances the pectorals and serratus magnus are also attacked.

In the most severe examples of the disease the condition may be even more widespread, implicating all the muscles inserted into the thoracic cage.

In many cases an attack of pleurodynia is determined, apparently, by exposure to cold or fatigue, and, as in other types of muscular fibrositis, these etiological factors are more effectual when the two influences co-operate.

The affection is very common in young adults, but it displays no marked partiality for either sex.

In women it can sometimes be directly traced to excessive or unusual muscular exertion, followed by exposure to draughts; thus, it often supervenes after spending many hours in a heated ballroom, the somewhat lightly clad subject being especially liable under such circumstances to contract a chill.

In other instances the onset appears to follow some sudden and explosive action of the muscles chiefly concerned, such as coughing and sneezing, and the patient may be inclined to attribute it directly to strain, but the action of trauma here is purely an associated one.

Clinical Account.

Pleurodynia is generally apyretic, even in cases where the pain is intense.

Diagnostic importance has been attached to this absence of pyrexia as differentiating the condition from pleurisy—a malady with which it has often been confounded.

But while true of the majority of cases, it must not be forgotten that a simple pleurodynia, like other forms of mild and localized fibrositis, is occasionally accompanied by fever of an ephemeral type.

As in all other rheumatic manifestations, pain occupies the premier place in the series of morbid phenomena; it is the sole symptom that the patient complains of, and, in short, constitutes for him the whole malady.

Site of Pain.—In the majority of instances such is experienced chiefly at the points of insertion of the intercostal muscles. Most commonly it is felt only in a small area on one or other side of the chest, and frequently, after the fashion of pleuritic pain, tends to localize itself near the nipple.

But in some instances the maximum degree of pain is felt over the sternal attachments of the great pectoral muscle, usually the left; indeed, pleurodynia appears to be most common on this side of the chest wall.

Sometimes, however, one whole side is the seat of pain, and when this is the case it has some diagnostic value; for it very seldom happens that pleurisy or pneumonia, at any rate in its initial stages, give rise to pain over so extended a surface.

In some cases the fibrous investment of the sternum and that of the ribs share in, or they may, indeed, be the chief site of, the morbid process.

In short, the morbid process does not always confine itself strictly to the muscles; and, in this particular type—pleurodynia —not only are the muscles and their tendinous attachments involved, but oftentimes their periosteal connections also.

Character of Pain.—The pain is very intense, much more so, generally, than in pleurisy, and far more frequently than in the latter condition forces the patient to cry out when through some unguarded movement a so-called " stitch " ensues.

Indeed, the severity of the pain in olden days led to the subject being leeched, bled, and blistered, under the conception that antiphlogistic remedies were indicated.

The pain is aggravated by motion of the trunk, inspiration, expiration, and especially coughing and sneezing.

To recline on the painful side is often more distressing than it is in pleurisy, and not infrequently the subjects believe themselves to be the victims of serious lung or heart trouble.

Very often their suffering is aggravated when the arm on the affected side is moved, especially if an attempt be made to raise it above the head.

To avoid pain, the affected side of the chest is as far as possible voluntarily immobilized, and consequently the respiratory excursions on that side are restricted.

Objective Signs.

When one directly examines the affected muscles, one does not generally note any swelling or redness of the skin; but palpation usually discloses undue tenderness of the muscles at certain spots, which, indeed, may be exquisitely sensitive to pressure, and at these sites the muscle substance appears to be œdematous.

When the periosteum over the breast-bone or ribs is coincidently implicated, areas of distinct swelling and puffiness are to be felt.

The annoying malady fortunately runs a comparatively short course, and usually is followed by complete resolution, but conforms to the rule that, should the inflammatory deposits haply become organized, relapses are only too prone to occur.

It is in the *intercostal and pectoral* muscles that indurations are most commonly to be detected, and when such nodules become swollen under the influence of some exciting cause acute exacerbations ensue.

As in other sites, their presence may lead to considerable disability and pain in the affected muscles. The movements of respiration are attended by a variable amount of discomfort, deepening at times to positive distress when unusual demands are made upon these structures.

When the periosteum over the breast-bone and cartilages is implicated, considerable suffering may result, and we have known a medical man, who suffered from repeated attacks of pain over the upper costal cartilages on the right side, go through a period of much anxiety until the true nature of the case had been established.

Care must also be taken not to overlook the presence of panniculitic deposits in these cases of thoracic fibrositis, for sometimes they give rise to an amount of suffering quite disproportionate to the causal lesion.

Lastly we may mention this significant fact, that occasionally the subsidence of an acute attack of pleurodynia is marked by the appearance of acute gout in the big toe; we ourselves have seen two instances in which this has occurred.

Differential Diagnosis.

Pleurisy.

Onset.—This is not so acute as in pleurodynia.

Symptoms.—Pyrexia is always present, also headache and malaise, with stabbing and stitch-like pain in region of nipple or axilla, and in addition a hard, dry, cough.

Physical Signs.—These consist of quickened respiration, with restricted movement of the affected side, friction fremitus on palpation, and on auscultation deficient breath sounds. Later there may be evidence of fluid effusion or commencing pneumonia.

Intercostal Neuralgia.

The pain is not localized, but radiates along the course of the affected nerve. It is more or less continuous, with paroxysmal exacerbations. Tender points over the exit of posterior primary, lateral, and anterior cutaneous branches are present.

Herpes Zoster.

Before the appearance of the eruption an absolute diagnosis is not possible. Herpes is more common in children, and pleurodynia in adolescents and adults, and with the pre-eruptive pain there may be fever and malaise.

Other sources of error that can be avoided by careful examination are the pressure pains of aortic *aneurysm*, the girdle pains of *tabes*, and those due to disease of the spinal column.

Dorsodynia.

The muscles in the upper portion of the back are very liable to be attacked by fibrositis, but they present no especial features other than those typical of the same disorder in other regions.

The nodules, when present, are usually situated in the trapezius, but not infrequently in the levator anguli scapulæ, the latissimus dorsi, or the erector spinæ.

Palpation will usually enable us to determine whether we are dealing with a nodule situated in the fasciæ or underlying muscles. To identify the actual muscle implicated is often difficult, especially if situated in the belly. Great help, however, will be derived by noting the special movement which evokes or aggravates the pain, as well as from the fact that such muscle nodules invariably run parallel to the longitudinal axis of the particular muscle at fault.

Deposits situated in the levator anguli scapulæ are usually located near its insertion into the base of the scapula at the superior angle, and such are not infrequently erroneously believed to lie in the trapezius. But by attention to the foregoing general rule, that the long axis of the nodule runs parallel to the longitudinal axis of the containing muscle, the chances of error will be minimized.

Tendon nodules are sometimes to be felt at the points of insertion of the ilio-costalis into the six lower ribs. In regard of their detection, it should be remembered that, the upper digitations being covered by the scapula, their palpation can only be attained by elevation of the arm on the affected side.

If nodules are present, pressure upon them will cause considerable pain, and lead to instinctive elevation and adduction of the shoulder.

In conclusion, we would emphasize the great variety of disorders, visceral and other, in this region, which can be, and often are, confounded with "chronic rheumatism."

Its diagnosis, therefore, should only be arrived at by the cautious method of exclusion, and only in the presence of definite objective findings in the muscles can it be held with any confidence.

Differential Diagnosis.

The majority of errors perpetrated in regard of the diagnosis of "chronic rheumatism" in this region are, in our opinion, referable to insufficient appreciation of the frequency with which *static disturbance* figures as a cause of neck, back, and shoulder pains.

The chief sources of fallacy relate to—

1. Lateral deviations of the dorsal spine.
2. Round shoulders and occupation kyphoses.
3. Malpositions and malformations of the scapula.
4. Visceral disorders.

Lateral Scoliosis.

Very commonly in neurotic persons vague pains are complained of in consequence of the abnormal muscular and ligamentary strain associated with such a faulty attitude.

Thus, young females, the subjects of slight dorsal curvature, sometimes pass into the Bath Royal Mineral Water Hospital under the diagnosis of "rheumatism." The aching and stiffness complained of is usually referred to the side on which the scapula protrudes in wing-like fashion. In such cases not only does the shoulder-blade project backwards, but it also lies at a higher level, and farther from the median line than normal. A mere glance suffices to show that, owing to the malposition of the scapula, the muscles attached thereto are acting at a mechanical disadvantage; hence the readiness with which a feeling of aching and fatigue is induced in them.

Round Shoulders and Occupation Kyphoses.

The neck and shoulder pains that occasionally trouble the subjects of these static deformities are but too frequently interpreted as being " rheumatic " in nature. This is, we think, due to the fact that we are prone to overlook the important part played by anatomical and mechanical anomalies in undermining the efficiency of the shoulder as a static machine. If we reflect, the shoulder is singularly lacking in skeletal support, for, with the exception of the coraco-clavicular ligaments, the sole remaining link is the attachment of the spine of the scapula to the acromial end of the clavicle, and indirectly through that bone to the sternum.

It is clear, therefore, that for the maintenance of its normal position and stability the shoulder has to rely largely on the *trapezius and other posterior scapular muscles*, which hold it erect and counteract the force of gravity.

When these muscles lose power, the shoulder-blade tends to sag downwards, and, simultaneously slipping forwards over the conical thorax, revolves as it were round its fixed attachment to the acromial end of the clavicle.

It is this forward and downward displacement through paresis of the scapular muscles that is largely responsible for the development of that everyday deformity, " round shoulders."

Now, while this condition—so frequent in adolescents—commonly establishes itself painlessly, yet if the intrinsic weakness of their scapular muscles is exaggerated through some debilitating illness or the maintenance of some habitual posture, pains make their appearance.

In precisely the same way as the latent weakness of a flat foot may become manifest after an attack of influenza, so may a " round-shouldered " adolescent begin to suffer pain through additional sagging of the shoulder-blade due to the muscular atony induced by illness or depressed health.

Similarly fatigue, weakness, and aching are often complained of by tailors, who sit cross-legged with their backs strongly flexed. Cobblers, joiners, and clerks, also blacksmiths, who constantly ply a hammer, are prone to suffer in the same way.

On observation, these persons usually present a rounded back, sloping shoulders, and protruding scapulæ, the "round shoulders" probably developed in youth being accentuated by their occupation.

Such cases are frequently admitted to the Royal Mineral Water Hospital, Bath, and said to be suffering from "rheumatism" in the neck and back.

Their static and non-rheumatic origin is strongly suggested by the following peculiarities: The pains are referred definitely to one or other of the posterior scapular muscles. Often they are localized to the occipital or scapular insertions of the trapezius, or to those of the levator anguli scapulæ, and there is tenderness to pressure at these points.

In some of these "round-shouldered" subjects—previously lacking subjective symptoms—the pain seems to be evoked by altered conditions of work. Thus, if put to labour at a bench too high for them, and so forced to stand more erect, greater strain is necessarily thrown upon the posterior scapular muscles.

If, moreover, their "round shoulders" are fixed and irreducible, pain may be complained of at the sternal attachments of their pectoral muscles, which in course of time, owing to the sagging forward of the shoulder, have undergone adaptive shortening.

Lastly, owing to their dorsal kyphosis, a compensatory lordosis is often present, and this, through the strain thrown on the sacro-iliac ligaments, may give rise to aching and pain in this region. The static origin of these pains is further shown by the relief that follows postural adaptation, altered mechanical conditions of work, and treatment directed to correction of the static deformity.

The static kyphosis seen in labourers as a consequence of carrying heavy weights upon their shoulders should also not be referred to "rheumatism." For the investigations of Sir Arbuthnot Lane have clearly shown that it is of the nature of an occupation kyphosis marked by adaptive structural changes in muscle, ligament, and bone.

Malpositions of Scapula.

In the early stages of prenatal life the scapula is situated on a level with the lower cervical vertebræ, sinking before birth to the site which it usually occupies throughout life. In rare instances this descent does not take place, and we get the condition known as "Sprengel's deformity."

Occasionally examples of this nature suffer from severe pains in the back and shoulder, which but too often pass muster as "rheumatism." In an example recently under our care the subject had suffered from shoulder pain and brachialgia for some seven to eight years, wandering from spa to spa under the diagnosis of "rheumatism," "gout," "neuritis," and so forth. The scapula on the affected side was found elevated above its fellow, and skiagraphy revealed the commonly associated malformations in the ribs on the same side.

Malformations of Scapula.

Goldthwait has observed that incurvation of the upper angle of the scapula is at times an unsuspected cause of shoulder pain. From a practical point of view it is important, moreover, to bear in mind that it usually occurs in round-shouldered persons.

This condition, as we know, develops very often in children of poor musculature, and, in sequence to the sagging forwards and downwards of the scapula, the soft growing bone loses contact with the thoracic wall, and so under muscular action becomes misshapen. Pain is evoked when the shoulders are thrown back and the upper angle of the scapula is driven into the rib, to be relieved when the shoulder drops forward.

If the hands are placed over the scapulæ, and the shoulders moved in various directions, the passing of the incurved bone over the ribs gives rise to creaking or crepitation, or a coarse noise which has been compared to a horse crunching oats.

In an instance under our own observation, more pain was evoked when moving the scapula up and down than when the shoulder was thrown back. In this case, too, careful palpation clearly indicated that the upper portion of the blade curved forward.

But for definite light on this question we are indebted to Goldthwait, who has by operation shown that disappearance of this subscapular pain and crepitation follows removal of the protruding portion of the bone.

Visceral Disorders.

If the pains complained of are in the interscapular region, our diagnosis of "chronic rheumatism" should be extremely guarded. While we have ourselves known a malignant growth springing from the scapula confused with "rheumatism," we have, of course, to bear in mind that the following grave disorders give rise to pain in this area: dorsal caries, aortic aneurysm, mediastinal growth — not to mention derangements of the stomach, such as gastric ulcer or carcinoma.

CHAPTER XVIII

FIBROSITIS OF ABDOMINAL MUSCLES

Introductory Remarks.

Of all the various forms of muscular fibrositis, that particular variety localized in the abdominal parietes has not as yet received the attention it deserves.

The physicians of a bygone school, it is true, emphasized its importance and the frequency of its occurrence; but their inability to bring forward any anatomical proof of their contention led to their views being dismissed as errors of observation, and their deductions as to its nature therefore unwarrantable.

Original Description.—Thus, as far back as 1792, J. P. Frank, in his epitome " De Morbis Hominum," referred to it under the term " peritonitis muscularis "; and though his title is a distinctly misleading one, yet the old physician made it abundantly clear that he sharply differentiated between the condition and true peritonitis.

For he states definitely his conviction that the disorder whose clinical features he wished to describe was the outcome of an inflammatory state of the connective tissues lying between the skin and the muscles of the abdominal wall.

Clinically, he said, the affection was characterized by fixed burning pain in one or other region of the abdominal parietes, which was aggravated by pressure, and still more by any movement of the particular muscle involved.

Thus, for example, he noted that, when located in the rectus abdominis, the effort of raising the body was intensely painful, if not impossible. Nor did he overlook the objective phenomena, having observed undue hardness of the affected parts, and sometimes a circumscribed swelling, which he believed to be due to localized effusion of coagulable lymph.

He remarked, too, that, notwithstanding the severity of the local symptoms, the pulse was not quickened, fever and vomiting were absent—in short, there were no signs indicative of visceral or peritoneal disorder.

We have alluded to this old physician's work in such detail as we believe it to be the first recorded description of "abdominal rheumatism," and in regard to the essential clinical features of the condition all recent research has but confirmed the accuracy of his observations.

Subsequently Chomel and Bouillaud described in detail the symptoms of "rheumatism" of the anterior and lateral parietes of the abdomen, followed later by Wolff's exhaustive study of the affection.

Still, for the most part the subject of "abdominal rheumatism" attracted but little attention; and, indeed, until quite recently any claims put forward for its recognition as a clinical entity were looked at askance.

About ten years ago, however, interest was revived in the question by Adler and Norstrom, who wrote most lucidly and convincingly on the condition, deprecating the unwarranted scepticism of the profession in regard to its existence, and instancing from their own experience numerous examples in which it had been confused with intra-abdominal disorders.

It is to the careful investigations of the foregoing observers that we are indebted for the primary recognition of the fact that in "rheumatism" of the abdominal parietes organized inflammatory deposits are to be found in the muscular and aponeurotic layers, and likewise in the subcutaneous tissues.

Moreover, they showed conclusively that, following their dispersal by massage, the subjective symptoms of pain disappeared, and accordingly they strenuously maintained—and, we think, with great show of reason—that the success of their treatment demonstrated the causal relationship of these myositic nodules.

Etiology.

There is nothing distinctive as regards the causation of this particular type of fibrositis.

Attacks appear to be determined by the usual exciting causes, cold and fatigue, and the fact that its victims are generally found to have suffered from other forms of fibrositis seems to indicate that it is essentially a manifestation of a gouty or so-called "rheumatic" diathesis.

Niemeyer recognized a rheumatic affection of the abdominal muscles, which, according to him, ensued generally after a severe strain of these structures, and he laid stress on the fact that the severity of the pain might excite suspicion of grave disease.

As regards sex incidence, Chomel believed it to be more common in women than in men, while Genest—on, it seems to us, very inadequate evidence—claimed that nursing women were exceptionally prone to suffer from this particular variety of rheumatism.

As opposed to this, Wolff's observation led him to assert that, if the affection displayed any sex predilection, it was for males rather than females, the more laborious life of the former conferring on them a greater predisposition.

Judging from our own experience as well as recorded instances, the disorder evinces no partiality for either sex, while it may be added that its occurrence even in children has been observed.

Clinical Account.

As in all other varieties of fibrositis, acute and chronic forms are to be distinguished. In the former the mode of onset may be startlingly abrupt, while in the latter the affection develops gradually and pursues a more persistent course.

The symptoms, in keeping with those of other inflammatory processes, fall into two categories—*general* and *local*; and to the description of the former we shall now proceed.

In the very acute forms of fulminant onset a rise of temperature to 100° or 101° F. sometimes occurs, but as a rule the disorder pursues an apyretic course.

Having regard to the severity and acuteness of the pain, the degree of pyrexia is strikingly slight, and in the matter of differential diagnosis may be taken to weigh heavily against the probability of the suffering being due to some grave abdominal lesion.

The pulse, though it may be quickened, is frequently unaltered, and never takes on a rapid and wiry character.

Similarly, though the patient may complain of general malaise, and although his face be flushed and full, yet it never assumes the sunken aspect typical of peritonitis.

The urine in the acute stages is high-coloured, and during convalescence may be loaded with urates, while there is a marked tendency in some instances to profuse sweating.

Beyond temporary loss of appetite, the functions of the gastro-intestinal tract remain undisturbed; there is neither vomiting nor nausea, though the evacuation of the bowels may be somewhat interfered with, owing to restricted activity of the abdominal muscles by reason of the pain induced through their contraction.

In the more severe cases this same factor may hamper the range of respiratory movements, comparably to what we are familiar with in the like affection of the thoracic muscles—pleurodynia.

We have in a previous section alluded to the fact that in so-called "epidemic forms" of acute muscular rheumatism the abdominal muscles may be the chief site of the morbid process.

Excluding these more severe types, it may be stated that the distinctive feature of most cases of abdominal fibrositis is the complete absence or trivial degree of general constitutional disturbance.

Local Symptoms and Signs.

Of these the essential one is *pain*, usually experienced at the actual site of the morbid process.

This may be located in the subcutaneous tissues, and be due to a panniculitic deposit, or it may be situated in the muscular or aponeurotic layers of the abdominal wall.

Site of Pain.—While either the anterior or lateral portions of the parietes may be attacked, it is in the flanks that it is most commonly met with.

Of individual muscles, the *obliqui* and *transversalis* are most often affected, and next in order of frequency the recti abdominis; and we may add that Wolff noted that occasionally the pyramidalis was involved.

The pain and sensitiveness to pressure are usually asymmetrically disposed, and though it may in very acute cases be widespread and involve the whole of one side of the abdomen, as a rule it is localized to a comparatively small area, and does not pass beyond the linea alba.

Frequently it is over the tendinous insertions of the muscles that the maximum distress is experienced. Thus, for example, it may be localized over the attachments of the internal oblique to the inferior borders of the cartilages of the six lower ribs, or of the recti into the fifth, sixth, and seventh rib cartilages along their anterior aspect on one or other side.

In other instances it may have its seat at or close above the insertion of the external oblique into the anterior half of the iliac crest, and in the neighbourhood of Poupart's ligament; or it may be located at or near the origin of one or other of the recti from the pubic crest and the ligaments in front of the symphysis.

But although the pain—as in most cases of muscular fibrositis—is more commonly experienced over the tendinous portion of the muscles, it is sometimes noted that even in these cases the responsible nodule or infiltration is embedded in the muscular substance at some distance from its attachment.

The frequent localization of panniculitic or myositic deposits in the right hypochondriac and iliac regions is worthy of special emphasis because of the closeness with which the local symptoms occasioned may simulate or mimic affections of the gall-bladder or appendix.

As a rule the pain shows no tendency to shift from its original site, but if, as sometimes happens, it suddenly migrates to remote muscles, such as those of the back or limbs, it will afford strong presumptive evidence that the case is one of fibrositis.

Character of Pain.—In the severe forms this is acute, and may be excruciating in intensity, but more often it is dull or aching. Because of the difficulty of compassing absolute rest for the affected portion of the muscle, the pain is more or less constant in the acute forms, though subject to periodic exacerbations in the presence of increased tension.

In the subacute forms the pain may completely disappear during quiescence, but it is evoked or increased by extension or by continuous or periodic contraction of the implicated muscle.

Movement in the acute forms giving rise to such intolerable distress, the patient lies constantly on his back, at the same time keeping his knees flexed, much after the fashion observed in peritonitis.

For the same reason respiratory movements in the affected area are more or less restricted, and efforts to defæcate and urinate, being attended by much pain, are attempted as seldom as possible.

With the spontaneous pain there is associated marked and often exquisite *tenderness to pressure.*

This increased sensitiveness, however, does not obtain in regard to *light or superficial palpation*, and is of value in differentiating the condition from referred pains due to visceral lesions.

Only *deep pressure* excites painful sensations, and this especially if exerted when the muscle is *tense or contracted.*

This is well exemplified in the case of the rectus abdominis, when—provided the patient is lying supine on the couch—no tenderness will be elicited by pressure over the affected portion of the muscle.

But if the muscle be brought into a state of active contraction by requesting him to rise into a semi-recumbent position, and one then presses deeply over the area of spontaneous pain, it will be found that exquisite tenderness exists at this site.

The same phenomenon may be elicited when the deposits are situated in the lateral abdominal wall, with this difference, that the oblique muscles cannot be properly palpated while the subject lies on his back. In this case, therefore, it is advisable to turn the patient over on to his healthy side. Then, in order to obtain relative fixation of the parts, he should be directed to hold his breath, when the same sensitiveness to pressure will be elicited over the spot where pain is complained of.

Site of Nodules.—In the case of the recti abdominis the deposits are more commonly to be met with at their point of insertion into the fifth, sixth, and seventh rib cartilages, lying in the angle between the costal arches and the xiphisternum. Occasionally, however, they are to be detected in the neighbourhood of their attachment to the symphysis pubis.

When the internal oblique muscles are the site of the morbid process, insertion nodules are most often met with along the outer surface and inferior margins of the six lower ribs, while in the case of the external oblique they are usually located in the iliac region, near its attachment to the iliac crest.

In its acute form the disorder is comparatively short, rarely extending beyond eight to ten days, always providing that complete absorption of the inflammatory exudates results. On the other hand, should organization occur, the duration may be prolonged indefinitely owing to the characteristic tendency to recurrence.

Apart from the endocardial changes that sometimes complicate acute forms of abdominal fibrositis, we have to note that occasionally other groups of muscles may be coincidently implicated, more especially the lumbar and thoracic group.

Diagnosis.

It need hardly be said that the importance of a correct diagnosis in this affection lies in the fact that these myositic deposits may, in accordance with their varying site, simulate a variety of intra-abdominal affections.

Among the considerations that will aid us in effecting a differentiation from these graver maladies *is the absence in fibrositis of any tendency to a progressive increase on the part of the symptoms*, which, indeed, as a rule remain more or less stationary.

Again, the absence of pyrexia, or at any rate *the relatively slight rise of temperature*, taken in conjunction with a lack of those symptoms typical of visceral disorders, should help greatly in our discrimination.

From the positive side we have the important fact that abdominal fibrositis is rarely *primary*, a history of attacks of lumbago, sciatica, or other forms of fibrositis being generally forthcoming.

Of local signs, *the indifference displayed to light palpation and the exquisite sensitiveness to deep pressure*—especially when the muscle is *contracted*—are of signal service in differentiating the affection from visceral disorders.

Lastly, in all but the more acute stages the actual presence of *nodules or infiltrations* in the affected area is usually ascertainable.

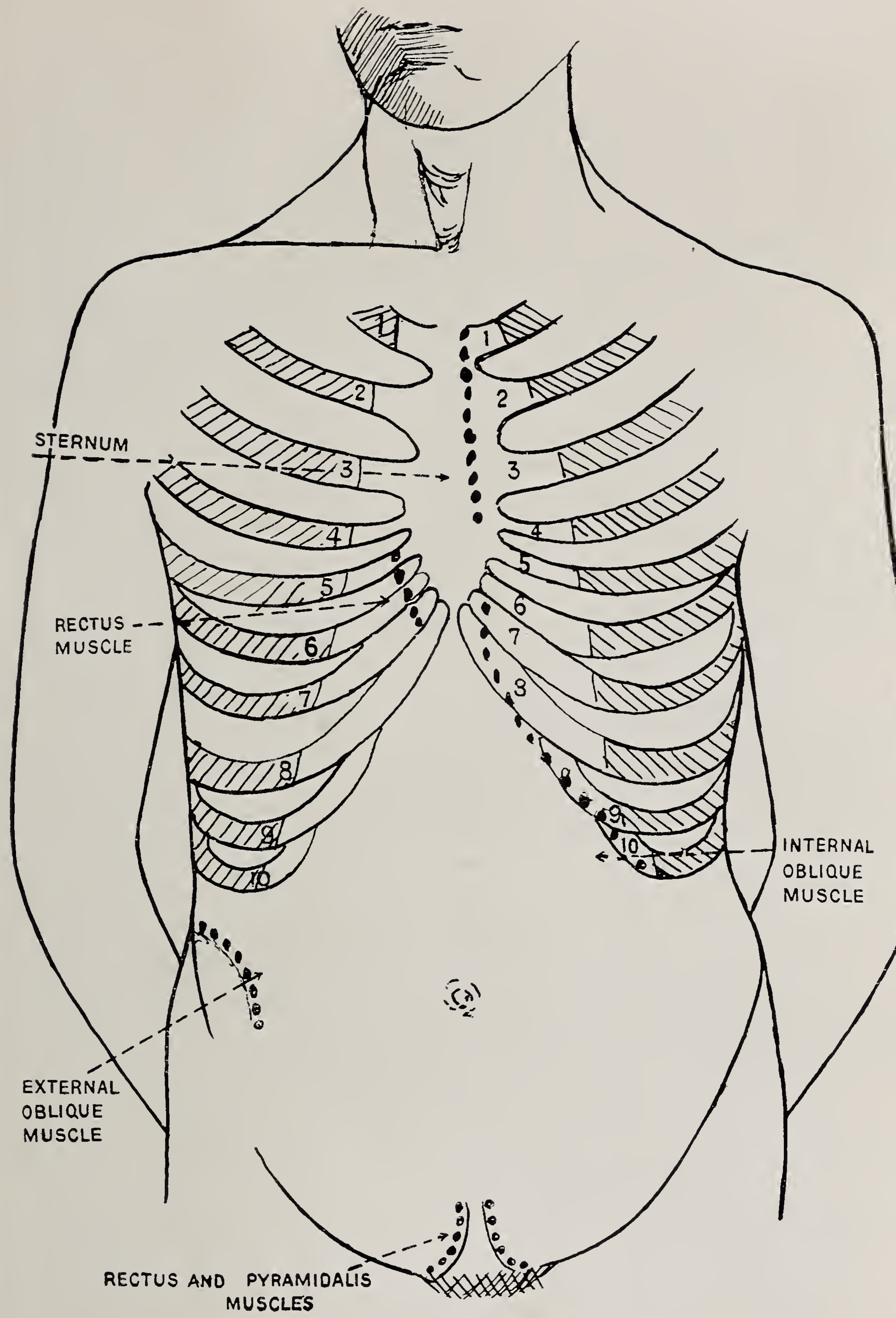


Fig. 47.—This diagram indicates the common site of nodules in the various types of abdominal fibrositis.

To face page 268.

Differential Diagnosis.

Appendicitis.

The discrimination between incipient appendicitis and fibrositis of the deep muscles and fasciæ in the lower segment of the right abdominal wall is at times a matter of no small difficulty.

The necessity for accurate determination is obvious, when we bear in mind that Adler of New York, who has paid particular attention to this question, states that " not a few normal appendices have been removed when the actual lesion was merely abdominal rheumatic myositis."

In this country Murray and Telling have recently laid stress upon the possibility of confusing this disorder with appendicitis, and we ourselves have seen the two affections confounded, and even a healthy appendix removed, under this misapprehension.

While the localization of myositic deposits in the right rectus muscle may result in this misconception, this is more likely to occur when the morbid process affects the obliqui muscles, especially the internal oblique in the region of the right iliac fossa.

The differential diagnosis will turn upon the fact that in appendicitis there is generally fever, with the usual constitutional symptoms of headache, vomiting, nausea, etc., features all of them, as a rule, conspicuously absent in fibrositis.

Tenderness to superficial or light pressure is to be elicited in appendicitis when the overlying muscles are flaccid or in a state of relaxation, as during recumbency.

Deep pressure, again, in this disorder may be impossible owing to reflex or defensive contraction of these same muscles.

In fibrositis, on the other hand, the muscle when relaxed is comparatively insensitive, but when contracted exquisitely tender, to deep pressure.

This sign is of diagnostic value, and, in conjunction with the usually trivial character of the general symptoms, has proved in our experience of the greatest practical value in enabling us to decide whether we were face to face with an intra-abdominal disorder or one of fibrositis of the abdominal wall.

In cases of chronic pain in the muscles overlying the iliac fossa the diagnosis should be guarded, save in the presence of clear evidence, by palpation, of muscular infiltrations or indurations in these structures.

Diseases of the Gall-Bladder.

Myositic infiltrations, when situated in the external oblique and other muscles attached to the right costal margin, have been confused with cholecystitis, as the following instructive case, quoted from Adler, shows:

"A female, forty-five years old, was suddenly seized with excruciating pain distinctly localized in the region of the gall-bladder, and radiating from thence into the back and epigastrium.

"The entire region was extremely sensitive to the slightest touch, and even the ordinary respiratory movements caused pain.

"The rectal temperature ranged from 100° to 101° F., the pulse was normal, and there were no signs of disease to be found in any organ. The suddenness of the attack, the strict localization in the region of the gall-bladder, and the fever suggested a possible acute cholecystitis, perhaps with incipient peritonitis.

"On the other hand, it could be urged that the woman had never before suffered from biliary colic, while she had at various times been subject to rheumatic affections.

"The very slight pyrexia, as compared with the extent and acuteness of the pain, seemed to tell against the assumption of a severe and deep-seated lesion. Further observation seemed necessary before a positive diagnosis could be made, though 'rheumatism' was thought most probable. After a few doses of salicylate of sodium the sensitiveness of the area affected diminished to such a degree that thorough palpation could be made, which demonstrated fresh inflammatory infiltrations in the muscles just below their insertion at the right border of the ribs.

"A few months later the same patient was seized with an entirely similar attack, the difference being merely that the inflamed area of muscles was located in the right quadratus lumborum."

Murray also records a case of a man, aged sixty, who had for four years suffered from pain in the right hypochondriac region, which had been attributed to gall-stones.

There had, however, been neither shivering, sweating, vomiting, nor jaundice. Examination revealed the presence of tenderness to pressure on the outer part of the upper border of right rectus, especially marked when the muscle was in firm contraction.

The absence of any signs pointing to hepatic disorder, when taken together with the local tenderness to pressure, established the nature of the affection, further confirmed by the fact that it was sometimes associated with pain in the muscles of the back.

In conclusion, it may be said that many other intra-abdominal affections have been confused with fibrositis, varying, of course, with its localization and the degree and intensity of the morbid process.

We have ourselves seen multiple deposits in the panniculus adiposus in the epigastric region treated as some vague gastric disorder, the pain and tenderness caused by which, however, totally disappeared after their dispersal by massage.

Telling, on this question of nodules in the abdominal area, remarks that even a solitary infiltration may occasion continuous and most excruciating paroxysms of pain.

The same observer states that *gastric ulcer, appendicitis, renal and biliary colic* have been confused with this condition, and that many negative laparotomies have been unnecessarily undertaken through a failure to recognize so-called "rheumatism."

Pleurisy.

Where pain over the attachment of rectus abdominis to the fifth, sixth, and seventh rib cartilages is complained of, inflammatory trouble of the pleura may be simulated.

In the case of *pleurisy* there would be fever, with its constitutional symptoms of headache, vomiting, etc.; in addition there would be a distressing dry cough. Not only would there be diminution of breath sounds, with friction sounds present on auscultation, but on palpation friction fremitus, with deficient expansion of the affected side, might be discovered.

In *fibrositis* these would be absent, and on strong contraction of the rectus abdominis muscle by rising into the sitting position pain would be greatly increased, while in addition tenderness would be marked over this area when such a movement was carried out. This would be absent in pleurisy.

Taking a deep breath in both cases would give rise to marked pain, in the one case owing to the tension of the muscle, in the other to the inflammation of the pleura.

Lumbo-Abdominal Neuralgia.

In this condition the pain is spontaneous, intermittent, and lancinating, while in fibrositis it is usually more varying and of a dull character.

In neuralgia the pain radiates from the lumbar region to the lateral abdominal area, and into the groin, thigh, or genital organs.

In fibrositis the pain is constant in site, and is only radiating in character when a "nodule" impinges on a neighbouring nerve.

In neuralgia, tender points are to be elicited (1) over the lumbar spine just outside the first lumbar vertebra, (2) at a point a little above the middle of the iliac crest, where the ilio-hypogastric nerve pierces the transversalis fascia, (3) at the lower part of rectus abdominis where the ilio-inguinal nerve perforates the transversalis muscle.

In fibrositis tenderness is only to be elicited over the site of the pain.

Diaphragmatic Fibrositis.

By the older physicians this variety was very confidently recognized, and more recently Gowers has expressed his belief that occasionally the morbid state localizes itself in the tendinous attachments of the diaphragm.

In this distressing affection each respiratory excursion gives rise to pain encircling the thorax at the level of the insertions of the midriff.

Hence there is an instinctive arrest of diaphragmatic movements to lessen the pain, and owing to the distress that deep breathing occasions respiration is shallow and may be entirely thoracic. Naturally, coughing, sneezing, and defæcation aggravate the suffering.

As regards recognition of the condition, it is perhaps allowable to diagnose this as the affection rather than diaphragmatic pleurisy when febrile movement and pleuritic effusion are absent.

CHAPTER XIX

REGION OF LOWER EXTREMITY: GLUTEAL AND CRURAL FIBROSITIS

Introductory Remarks.

Fibrositis in the lower extremities may be widespread, involving both upper and lower segments of the limb. Or it may be localized to the gluteal muscles, those of the thigh, or, on the other hand, it may be limited to the peroneal and calf muscles, and in rare instances to the plantar muscles of the foot.

As in other regions of the body, the underlying morbid process rarely restricts itself entirely to the muscles, but generally implicates the fascial coverings, which envelop and penetrate the limb in the form of intermuscular septa.

Occasionally also, as in the case of the upper extremity, the fibrous capsules of the joint, or the similar investments of the nerve trunks, are coincidently or subsequently implicated.

Consequently the clinical picture presented is hardly, if ever, a pure unalloyed one of so-called muscular rheumatism, but rather one in which muscle, fascia, and nerve sheath are affected, the changes in the muscular structures, however, predominating.

Gluteal Fibrositis.

The gluteal region is one of the sites of predilection, and, because of the important part played by the fascial layers of the buttock, some brief reference to its anatomical peculiarities will not perhaps be out of place.

Anatomical Peculiarities.—The deep fascia of the buttock, an extension of the fascia lata, is a structure of much importance. Tethered above to the iliac crest, sacrum, and coccyx, it descends in front over the gluteus medius, extending as far as the anterior border of the gluteus maximus, at which point it divides into two layers, which pass before and behind this great muscle.

While the gluteus maximus is thus enclosed between two layers of fascia, the underlying gluteus medius and minimus lie in an osseo-aponeurotic space, which is closely sealed above, but open below towards the thigh, and also internally at the sciatic foramen.

We see, therefore, that symptoms due to increased tension will readily supervene in the event of any inflammatory process taking place in the lesser gluteal muscles, as the effused products will be pent up between a layer of bone on the one side, and a layer of fascia on the other.

Hence the frequency with which so-called "fibrositis of the buttock" gives rise to sciatic pain, the unyielding nature of the surrounding tissues directly favouring the production of pressure symptoms.

Apart, moreover, from these sciatic pains due to mere mechanical influences, a direct extension of the morbid process to the sheath of the nerve is rendered easy by the fact that the osseo-aponeurotic space, in which the gluteus medius lies, freely communicates with the sciatic foramen through which the nerve emerges.

The importance of the foregoing anatomical considerations lies in the fact that, though all the gluteal muscles are liable to fibrositis, the morbid process is especially prone to develop in the sheath or substance of the gluteus medius.

Clinically, too, it throws a light on the mode of genesis of sciatic neuralgia, and even neuritis, many examples of which supervene secondarily to a more or less diffuse fibrositis of the fascial and muscular layers of the buttock.

We have a precisely analogous condition in the shoulder, in which a diffuse fibrositis of the deltoid muscle may through pressure by nodules or direct extension of the pathological process give rise to a brachialgia or even a brachial neuritis.

Etiology.—Its subjects are commonly drawn from the ranks of the gouty and dyspeptic or those who have been reduced in vigour by some depressing agency or by exposure to vicissitudes of temperature.

In investigating such cases, nothing is more striking than the frequency with which their onset immediately follows sitting or standing in wet clothes or on damp ground. Albeit an attack is more surely induced if at the same time the gluteal and crural muscles are subjected to excessive exercise or strain. Hence the frequency with which it is met with in miners, labourers, and gardeners, who in plying pickaxe or spade are perpetually stooping and rising in pursuance of their calling.

Again, during the progress of the campaign in Flanders, we have observed many instances of the disorder in British and Belgian soldiers who had been invalided from the theatre of the war as being unfit for further service. The sufferers almost

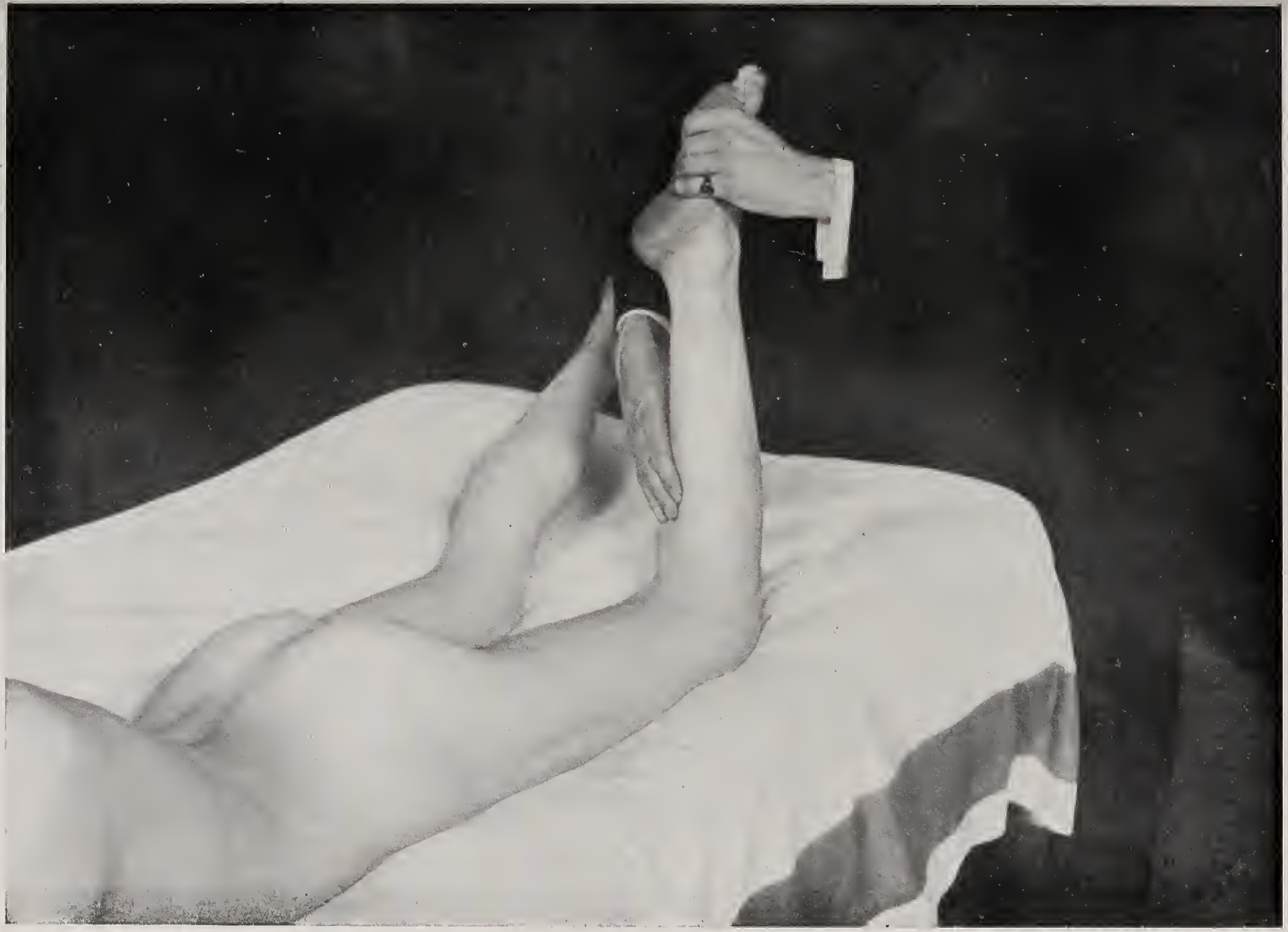


FIG. 48.—Arrangement of patient most suitable for palpation of nodules in gastrocnemius.

To face page 274.

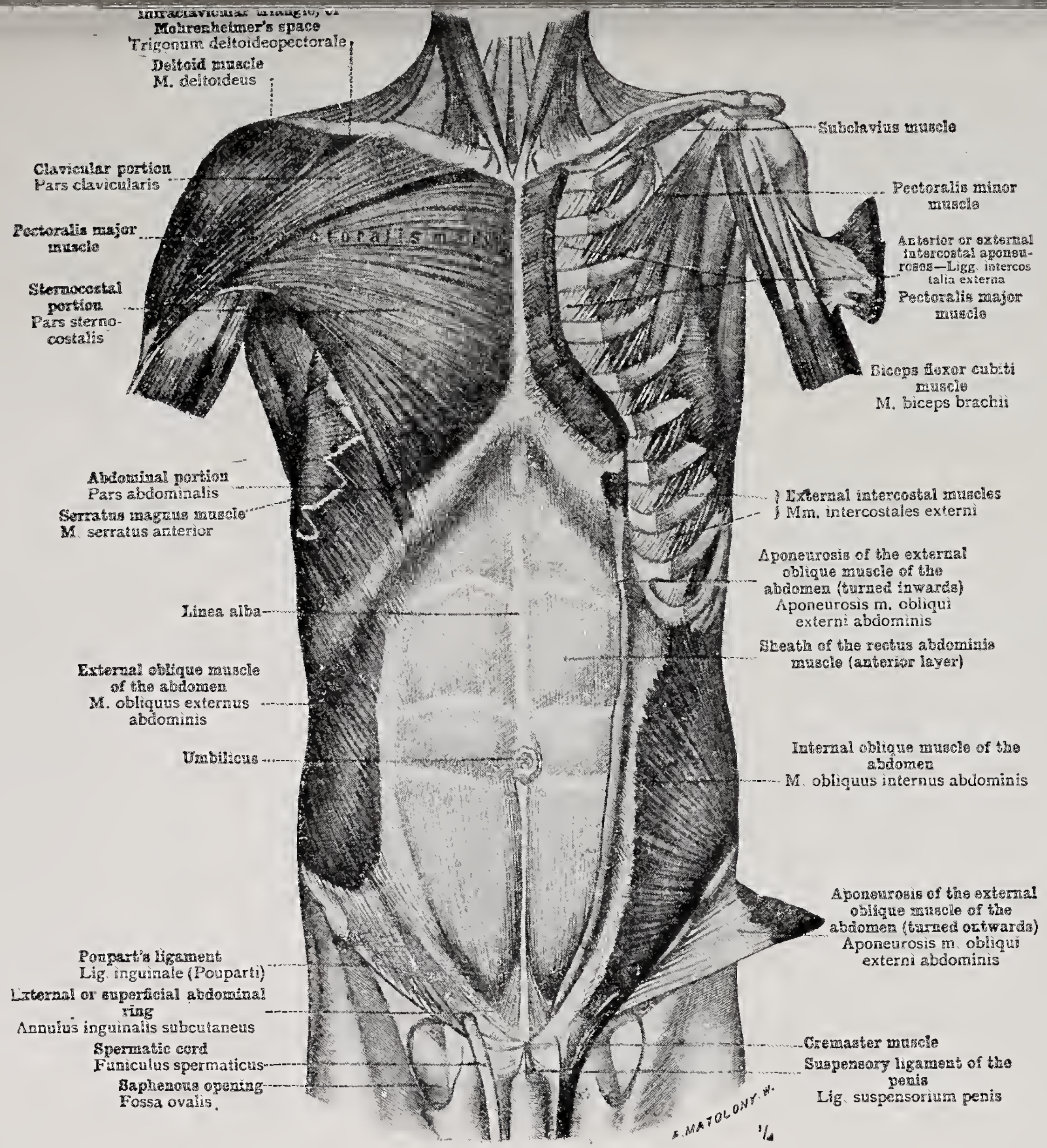

Mohrenheimer's space
Trigonum deltoideopectorale
Deltoid muscle
M. deltoideus
Clavicular portion
Pars clavicularis
Pectoralis major muscle
Sternocostal portion
Pars sterno-costalis
Abdominal portion
Pars abdominalis
Serratus magnus muscle
M. serratus anterior
Linea alba
External oblique muscle of the abdomen
M. obliquus externus abdominis
Umbilicus
Poupart's ligament
Lig. inguinale (Pouparti)
External or superficial abdominal ring
Annulus inguinalis subcutaneus
Spermatic cord
Funiculus spermaticus
Saphenous opening
Fossa ovalis
Subclavius muscle
Pectoralis minor muscle
Anterior or external intercostal aponeuroses—Ligg. intercostalia externa
Pectoralis major muscle
Biceps flexor cubiti muscle
M. biceps brachii
External intercostal muscles
Mm. intercostales externi
Aponeurosis of the external oblique muscle of the abdomen (turned inwards)
Aponeurosis m. obliqui externi abdominis
Sheath of the rectus abdominis muscle (anterior layer)
Internal oblique muscle of the abdomen
M. obliquus internus abdominis
Aponeurosis of the external oblique muscle of the abdomen (turned outwards)
Aponeurosis m. obliqui externi abdominis
Cremaster muscle
Suspensory ligament of the penis
Lig. suspensorium penis
E. MATOLONY W.
1/4

FIG. 49.—In this are shown the thoracic and abdominal muscles: on the right side the most superficial layer, and on the left side the layer immediately beneath this. (Toldt's Atlas.)

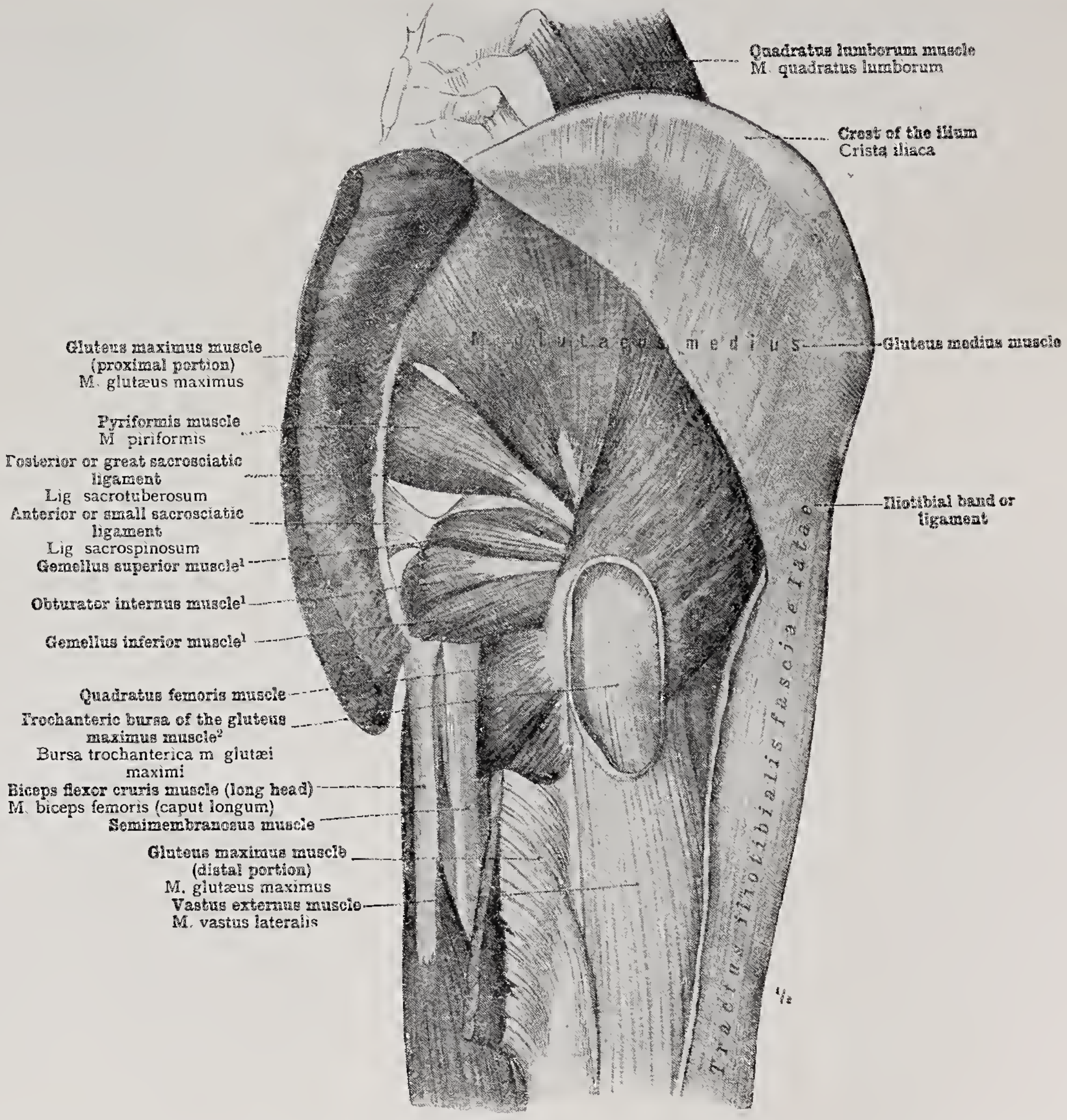

Quadratus lumborum muscle
M. quadratus lumborum
Crest of the ilium
Crista iliaca
Gluteus medius muscle
M. glutaeus medius
Iliotibial band or ligament
Tractus iliotibialis fasciae latae
Gluteus maximus muscle (proximal portion)
M. glutæus maximus
Pyriformis muscle
M. piriformis
Posterior or great sacrosciatic ligament
Lig. sacrotuberosum
Anterior or small sacrosciatic ligament
Lig. sacrospinosum
Gemellus superior muscle¹
Obturator internus muscle¹
Gemellus inferior muscle¹
Quadratus femoris muscle
Trochanteric bursa of the gluteus maximus muscle²
Bursa trochanterica m. glutæi maximi
Biceps flexor cruris muscle (long head)
M. biceps femoris (caput longum)
Semimembranosus muscle
Gluteus maximus muscle (distal portion)
M. glutæus maximus
Vastus externus muscle
M. vastus lateralis
1/2

FIG. 50.—Second layer of the external muscles of the hip displayed by the division of the gluteus maximus muscle and the posterior portion of the fascia lata. Note particularly the position of the gluteus medius, the muscle most commonly attacked by fibrositis. (Toldt's Atlas.)

To face page 274.

invariably ascribed their trouble to having been engaged in waterlogged trenches while chilled by wind and rain. Doubtless, too, in their instance, the localization of the disorder in the gluteal and crural muscles was largely determined either by exigencies of space which compelled their continued assumption of cramped or stooping postures, or by the strain thrown upon these particular muscles when forced to maintain an erect and immobile pose throughout some prolonged and anxious vigil.

Apart from the foregoing local factors, we must not discount the effect upon the organism of the depressing environmental conditions under which modern warfare is waged. The mental strain and loss of sleep when exposed to incessant shell or rifle fire no less than the sudden calls upon the system for intense muscular effort all tend to slowly but surely sap the vital powers of resistance.

The state of nervous exhaustion thus produced cannot fail in its turn to depress digestive capacity, and this, taken together with the dietetic irregularities inevitable under such circumstances, must promote the development of those functional or catarrhal derangements of the alimentary tract which prove so favourable to the occurrence of subinfection.

Clinical Account.

In general the onset is gradual and indefinite, but in the more acute forms the patient may be able to fix its time of inception almost to an hour.

It is ushered in by a sense of aching and stiffness in the gluteal region, which often spreads down to the thigh. The disability is especially marked during flexion or lateral inclination of the trunk away from the affected side.

Site of Pain.—When asked to indicate the actual locality of the pain, the subjects do not refer it accurately to the track of the sciatic nerve or any of its branches.

On the other hand, they invariably map out with the palm of their hand the origin, course, or insertion of one or more of the gluteal muscles. If the pain extends down the thigh, it is usually referred to the *outer* side, either along the tensor vaginæ femoris or the vastus externus.

In other instances it follows the course of the biceps cruris, but only rarely that of the semi-tendinosus, and in the case of the former the pain is usually prolonged over the outer head of the gastrocnemius.

The salient point to grasp in these cases is that the patient, when asked to localize the pain, distinctly refers it to the *muscles, and not to the course of the sciatic nerve.*

Moreover, when the pain shifts or moves, it may be traced from one muscle through its fascial expansions to another.

There are, at any rate in the early stages, no complaints of tingling and numbness, " pins and needles " in the foot, such as are met with in genuine sciatic neuralgia.

These features support our contention that the morbid process chiefly affects the superficial and deep aponeurotic coverings of the gluteal muscles, and in some cases those of the tensor vaginæ femoris and outer hamstrings.

We would lay stress on this point, as not a little misapprehension as to the true site of the pathological change is, we believe, assignable to the habit of not requesting the patient *himself* to locate the painful sensations.

Far too frequently the examiner proceeds straight away to seek the signs of local nerve tenderness by digging fingers or fist into the gluteal or crural regions, and often, we feel sure, gets an erroneous impression as to the site of the disorder.

The subject of gluteal fibrositis is rarely at first incapacitated for exercise, but his discomfort is invariably aggravated by it

If he lies up in these early stages, he usually gets well, but too often, labouring under a delusion that the pain will pass off of itself, the mischief is allowed to proceed unchecked.

Eventually the pain, instead of being, as at first, referred by the patient to muscular and fibrous parts, is now transferred to *the course of the sciatic nerve.* Increasing suffering and disability at this stage ensue, with sensory paræsthesiæ referred to the foot. Ultimately the subject is compelled by distress to take the rest so urgently needed.

Objective Phenomena.

At this period examination of the affected region usually reveals the pressure of strands or nodules in the gluteal muscles and fasciæ, the outcome of the long-continued and insidious fibrositis.

To allow of a satisfactory palpation the patient should lie on his sound side. The affected limb should then be abducted and overextended, and the knee at the same time flexed.

In this way the greatest relaxation of the gluteus maximus will be secured, and thorough palpation, not only of this muscle, but also of the underlying gluteus medius, will be greatly facilitated.

Site of Nodules.—In the case of the gluteus maximus they may be detected at its upper margin, but more commonly they are to be found at the level of its lower border, which, as we know, lies considerably below the fold of the buttock.

If their presence here can be excluded, we should then proceed to palpate the superior curved line, the site at which insertion nodules most commonly develop in the gluteus medius or its sheath.

As we saw in our section on pathology, the results of surgical intervention conclusively show that a solitary nodule in the buttock may be the sole cause of an obstinate and inveterate sciatica.

To sum up, then, we see that in the initial stages of gluteal fibrositis the symptoms produced may be readily misinterpreted as sciatica, but careful examination will show the following points of differentiation:

1. The pain is referred by the patient, not to the sciatic nerve, but to the muscular and fibrous structures.

2. There is an absence of tenderness actually over the nerve trunk, and also of sensory paræsthesiæ, referred to its area of distribution.

3. The pain differs, too, from that of sciatica in that it is less radiating, partaking more of a diffuse feeling of tenseness or stiffness, referred more especially to the fibrous attachments of muscles or aponeuroses.

4. The pain, too, in uncomplicated gluteal fibrositis is certainly less severe, though more constant, than in true sciatica, and lacks the tendency to paroxysmal exacerbation.

While the foregoing constitute the symptoms characteristic of a pure gluteal fibrositis, we have to note that with the persistence and extension of the morbid process we get superadded those of definite sciatica, either as a consequence of direct pressure by a nodule, or actual extension of the morbid process to the nerve sheath. In such event the pain loses its diffuse character, and concentrates itself on the track of the nerve.

The clinical features of sciatica will be considered later, and their description need not be entered upon.

Lastly, that a simultaneous involvement of the muscles and nerve sheaths occasionally occurs is no doubt true, but because of its intimate bearing on the prevention and treatment of sciatic pain we would especially emphasize the importance of recognizing that type of sciatica, which ensues secondarily to gluteal fibrositis.

Crural Fibrositis.

Upper Segment of Limb or Thigh.

In the thigh the fascia lata completely invests the limb, this fibrous covering being more highly developed on its outer side, and less so on its upper and inner aspect.

The thickened part of this dense membrane, which runs down the external side of the limb between the crest of the ilium above and the outer tuberosity of the tibia and the head of the fibula below, is known as the "ilio-tibial band."

From the point of view of fibrositis, this structure in our experience calls for especial mention, being one of the favourite sites in which this morbid process develops.

The pain, aching, and stiffness produced by it may be very considerable, and are especially marked during standing and walking, presumably because the fascia then is more strongly contracted.

The *nodules* or more diffuse infiltrations are usually quite easily detected by palpation. They appear to be more common in the lower half of the membrane than the upper, and we are inclined to think that, when situated in the latter site, the condition may give rise to the symptoms generally associated with *meralgia parœsthetica*, in consequence of the compression of the external cutaneous nerve as it pierces the aponeurosis.

The fascia lata near the front of the knee is of great density, and fibrous indurations are not uncommonly met with in this neighbourhood, either actually in the ligamentum patellæ itself, the tendinous expansions of the thigh muscles, or the intermuscular septa.

Such thickenings are sometimes to be felt in the sheaths of either the internal or external vasti muscles, and, indeed, may be the isolated expression of a so-called "rheumatic diathesis," giving rise to pain, aching, and stiffness, which with remissions may endure for an indefinite period.

Where the tendinous expansions of the thigh muscles are involved, the capsule of the knee-joint frequently participates, and similar thickenings may be found in its substance.

In rare instances we have seen the fascia lata over a large extent, and likewise the subcutaneous tissues, the seat of widespread fibrous hyperplasia, strands and nodules being scattered throughout its limits, but chiefly along its external aspect.

In such examples of long-standing and inveterate character the subject is rarely free from a certain amount of aching and stiffness, which from time to time undergoes aggravation.

It may be symmetrical, but is usually more severe on one side, and in one instance under our notice the thigh was distinctly smaller than its less affected fellow.

Scudamore records an instance of "chronic rheumatism" under his care, in which multiple thickenings of this nature were present throughout the fascia lata.

Occasionally the tendinous insertions of the hamstrings, as

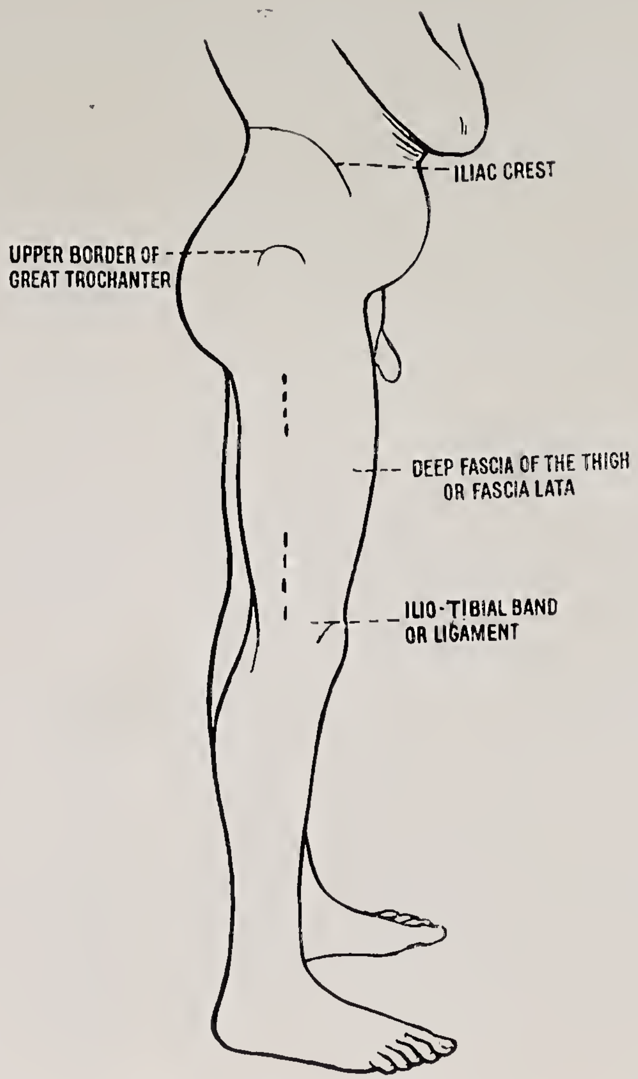

ILIAC CREST
UPPER BORDER OF GREAT TROCHANTER
DEEP FASCIA OF THE THIGH OR FASCIA LATA
ILIO-TIBIAL BAND OR LIGAMENT

Fig. 51.—This diagram illustrates the most common sites for nodules in fibrositis of the ilio-tibial band.

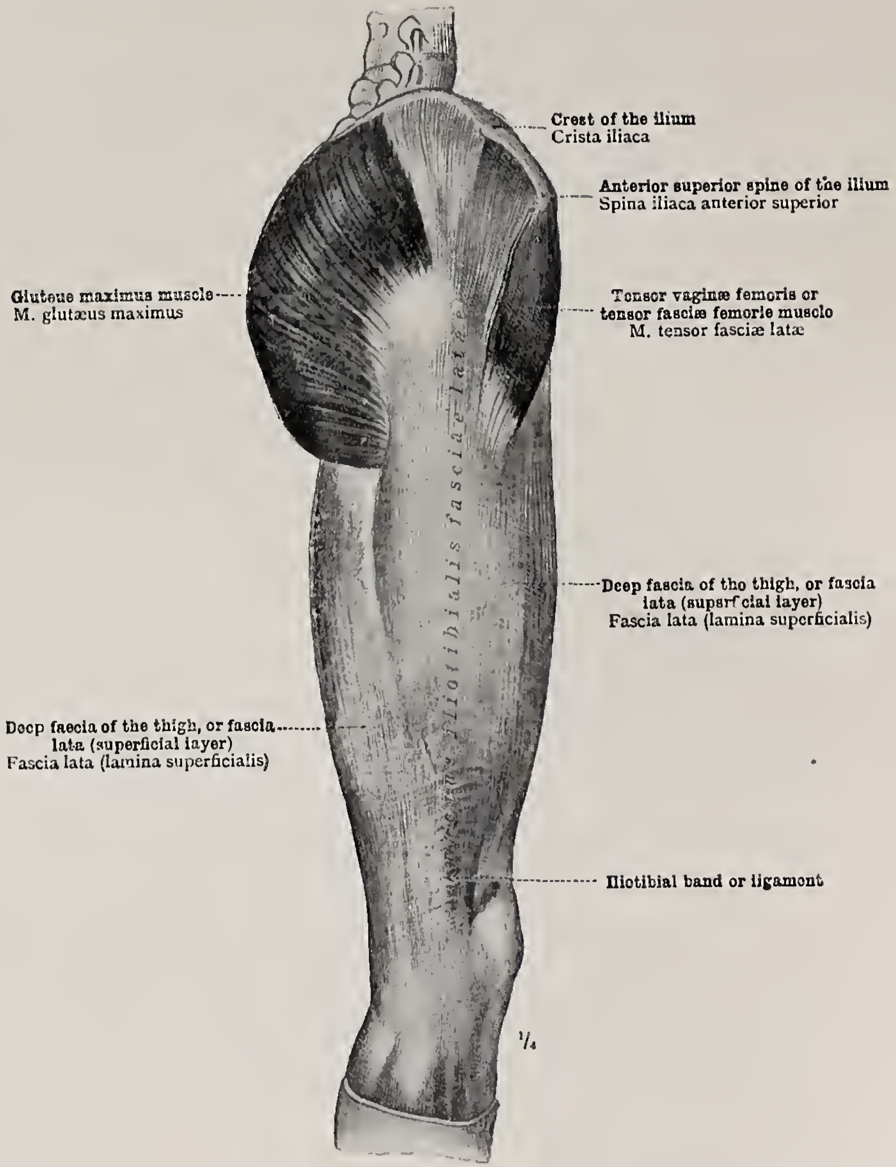

Crest of the ilium
Crista iliaca
Anterior superior spine of the ilium
Spina iliaca anterior superior
Glutous maximus muscle
M. glutæus maximus
Tensor vaginæ femoris or tensor fasciæ femoris muscle
M. tensor fasciæ latæ
Deep fascia of the thigh, or fascia lata (superficial layer)
Fascia lata (lamina superficialis)
Deep fascia of the thigh, or fascia lata (superficial layer)
Fascia lata (lamina superficialis)
iliotibialis fasciae latae
Iliotibial band or ligament
1/4

Fig. 52.—Deep fascia of the thigh, or fascia lata, seen from the outer side, with the thickened band of fascia known as the ilio-tibial band, a favourite site for fibrositis. (Toldt's Atlas.)

To face page 278.

well as the fascia underlying them, become thickened and knotty, and such a condition may be associated with similar changes in the gluteal region.

Lower Segment of Limb or Leg.

Several instances of this nature have come under our observation, in which the aching at the back of the thigh and popliteal space have been erroneously diagnosed as genuine sciatica.

The similarity to sciatica is enhanced by the fact that fibrositis in this region may encroach or impinge on the external branch of the sciatic trunk, and may radiate throughout the distribution of the peroneal nerve.

In the leg *myositic deposits* are most commonly met with in the muscles of the calf and the peronei, and in the case of the former are more frequently situated in the inferior third of the inner portion of the belly of the gastrocnemius.

To facilitate palpation of the gastrocnemii the knee should be strongly flexed. Then, after smearing the parts with liquid paraffin, one will be able to detect a hard circumscribed deposit more or less sharply defined from the surrounding tissues.

The success that attends our efforts will largely depend on the degree of hypertonus present, and the greatest care should be taken to avoid its increase by rough handling.

Frequently the thickening takes the form of a long fibrous strand or bundle, which may traverse the whole length of the muscle, while in the surrounding tissues smaller infiltrations of more discrete character may be perceptible.

Often such deposits in the calf muscles are attended by considerable *swelling* of the neighbouring parts, especially towards the evening after exercise or standing.

In addition, in severe cases there is a marked tendency to *hyperidrosis* of the feet as well as *venous stagnation.* The affected muscles become weak and seriously incapacitated for any prolonged exercise, while muscular cramps, especially at night, are troublesome features.

Where *varicose veins* coexist, the condition is as a rule aggravated, and not uncommonly complicated, by *villous arthritis of the knees.*

Norstrom, discussing fibrositis of the lower limb, states that the peroneal muscles may be extensively infiltrated, usually in their lower third.

He is inclined to believe that the particular pain so commonly experienced in this peroneal region in cases of assumed sciatica is in reality due to the muscular lesion.

From our own experience we can confirm him in regard to this confusion, the possibility of which is much enhanced if the glutei are at the same time the seat of similar deposits.

Norstrom and Stockman also comment on the frequency with which nodules are encountered in the plantar muscles near their origin from the os calcis, an observation the truth of which we can fully bear out.

In concluding this résumé of the features of fibrositis in the lower extremity, we would draw attention to the frequency with which they are attributed to sciatica.

So commonly does one meet with such instances, that one would urge the necessity for more careful and habitual palpation of the muscles and aponeurotic structures, as the only means of differentiating these spurious sciatic pains from those due to actual fibrositis of the sheath of the sciatic trunk.

Diagnosis.

The diagnosis of muscular "rheumatism" of the lower extremity, like all other types of muscular fibrositis, must not be arrived at rashly, having regard to the largely subjective character of the malady and the frequency with which its particular symptoms are simulated by or arise secondarily to other affections.

When we consider how often pain in the lower limbs is the outcome of *pelvic disorders*, uterine, vesical, or rectal in site, we see how essential it is in all cases to exclude such intrapelvic lesions.

Again, the possibility that the pain, bilateral or otherwise, may be due to some morbid process involving the *vertebral column, meninges, or the cord* itself, must not be lost sight of.

Nor must we forget to eliminate, if necessary by radiography, gross trouble not only in the *hip and other joints* of the limb, but also similar morbid processes affecting the *shafts of the bones* themselves or their periosteal covering, keeping in mind always the possibility of a syphilitic taint being the *fons et origo mali.*

These graver sources of error having been excluded, we should now, as in all cases of fibrositis, investigate the history, note the occupation, and endeavour, if possible, to identify some gouty, rheumatic, or toxic state to which its origin may possibly be referred.

The site of the pain should be carefully scrutinized, and its location by the patient given due consideration.

Subsequently we should endeavour to determine the site of objective tenderness, whether situated diffusely over certain regions, notably the gluteal, or whether actually over the sciatic trunk.

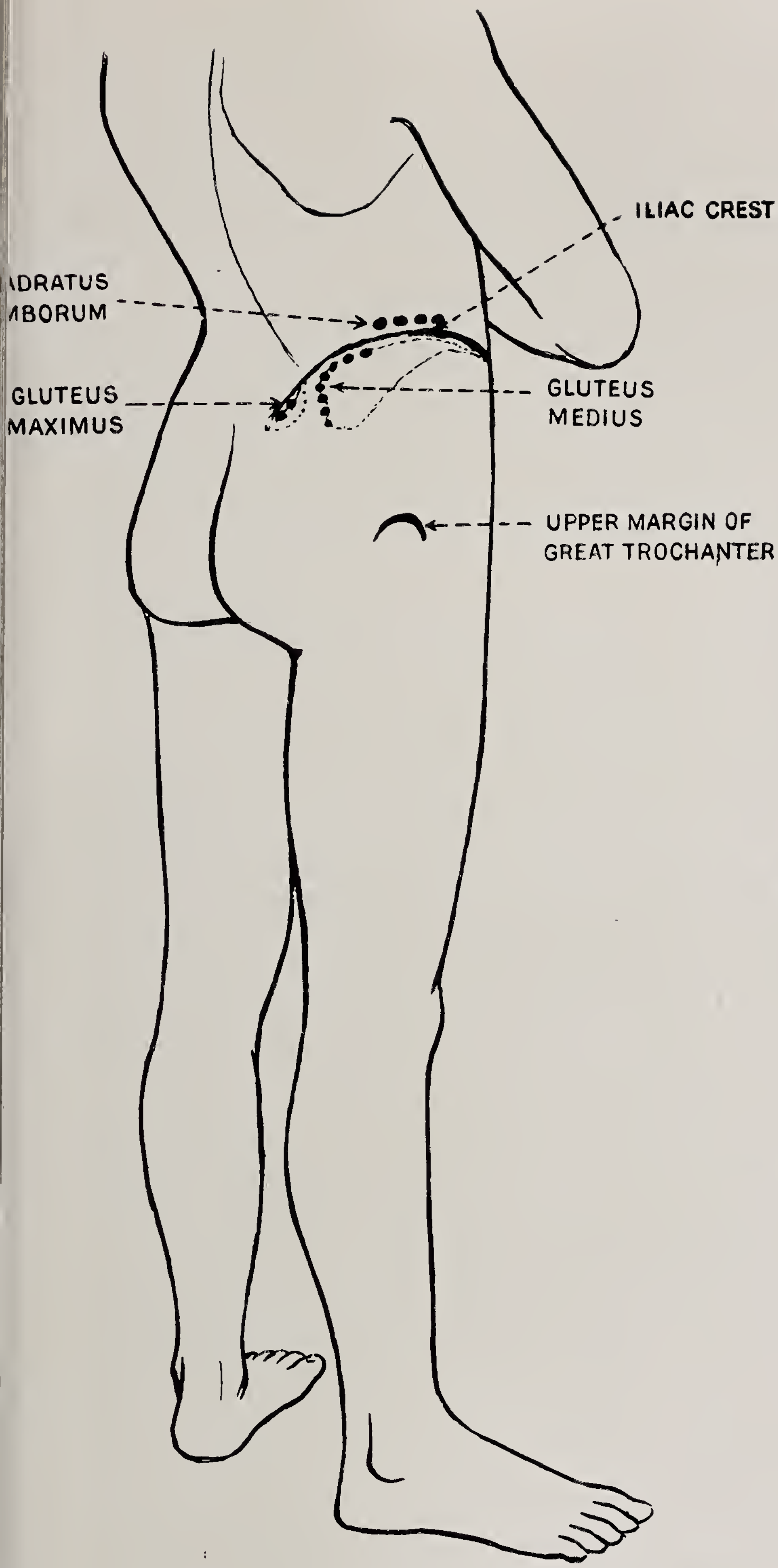


Fig. 53.—Diagram to illustrate the most common sites for nodules in gluteal fibrositis. Frequently also there are nodules lying close above the iliac crest, in the attachments of the quadratus lumborum thereto.

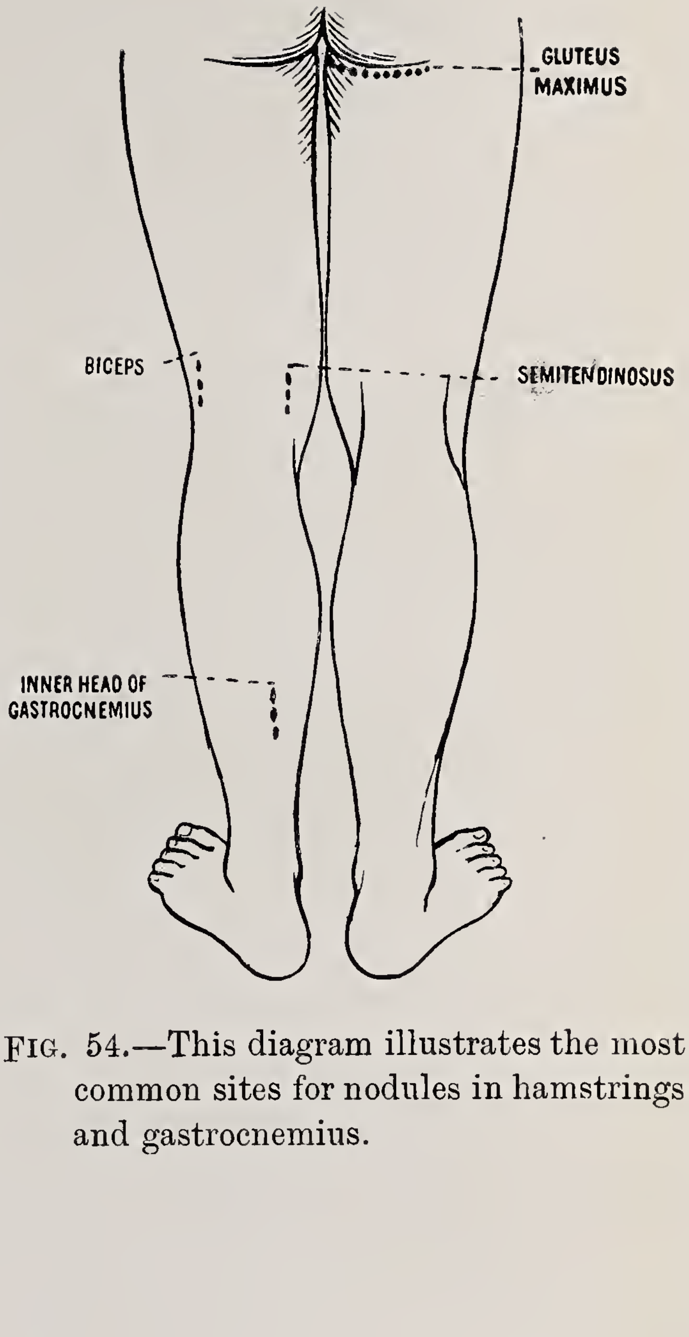


Fig. 54.—This diagram illustrates the most common sites for nodules in hamstrings and gastrocnemius.

To face page 280.

Any particular movement that evokes or aggravates the suffering should be remarked. Thus, for example, in gluteal fibrositis any interference with the functional efficiency of the gluteus maximus—difficulty in rising from a sitting posture or in walking upstairs—should be noted as an aid to more exact localization of the morbid process.

Or, having regard to the greater frequency with which the gluteus medius is implicated, attention should be paid to the power of internal rotation of the thigh, bearing in mind the important part played in the performance of this movement by the tensor vaginæ femoris, a structure likewise particularly prone to be the seat of fibrositis.

Detection of Nodules.—In all cases not only the muscles, but also their fascial coverings, should be palpated for the presence of fibrous strands or nodules as objective evidences of the nature of the disorder.

Nor should we be misled as to the primary *myogenous* origin of the affection if the patient at the same time complains of pains radiating down one or other of the nerve trunks of the limb. For commonly such secondary pains are referred to the periphery, which, of course, enhances the possibility of misinterpretation.

Careful palpation of the muscles along the track of the nerve, by establishing the presence or absence of nodules, will help us to differentiate the pains from true sciatic neuralgia. If deposits can be detected, pressure upon them will evoke a paroxysm of radiating pain precisely similar to that complained of.

For further differentiation of these myogenous pains from other neuralgic or neuritic affections of the lower limbs we would refer the reader to forthcoming sections.

We shall now pass on to consider the differential diagnosis from other conditions, notably those belonging to the class known as "occupation myalgias," and that important class concerned with static deformities in the lower extremities.

Differential Diagnosis.

The disorders that simulate "chronic rheumatism" in the lower extremity are many and diverse, and in the interest both of accurate diagnosis and rational therapy their differentiation calls for greater attention.

The chief sources of fallacy relate to—(1) Occupation myalgias; (2) local and referred pains of flat feet, hallux valgus, etc.; (3) neurasthenia; (4) syphilitic osteal pains; (5) alcoholism.

(1) *Occupation Myalgias.*

In the upper limb such pains are usually " dynamic " in origin—namely, due to the frequent repetition of a particular series of muscular movements, such as are incidental to telegraphy, piano-playing, and similar callings.

On the other hand, in the lower limb they are usually referable to static causes—*i.e.*, to some particular trade or occupation, whose pursuit involves an unequal distribution of the body weight.

To take a common instance, the mere act of wielding a shovel or a broom day by day will often give rise to painful cramp in the leg, if the body is constantly supported on one limb during the process.

Greater pain and disability, though of a similar nature, is frequently complained of by those who by means of one foot work a press or an engine. Curiously enough, it is not the leg which works the press that becomes painful, but the other, which is held in an extended strained position while the force is applied to the pedal.

Workers in factories, compositors, and the like are those who are prone to suffer, and dentists also often experience similar symptoms, whence the term " dentist's limp."

Walsh of New York has drawn attention to the fact that tramway drivers are liable to a similar occupation disability, due to the fact that when using their brakes they constantly swing round on the one leg as a pivot.

Clinically the consequence of such abnormal distribution of body-weight first reveals itself by fatigue in the muscles of the strained limb. Later, if persisted in, the tired feeling mounts to the level of a positive ache, and ultimately the limb becomes weak as well as painful. The aching sensation may be diffused over the limb, or may be referred to the calf and back of thigh, when it very commonly passes muster as a " sciatica."

In other cases it is referred to the knee, and treated as " rheumatism," and in some to the loin, where it passes as lumbago.

These pains and aches, which develop in overworked muscles, do so more swiftly when the subject for any cause is run down through functional derangements or overwork.

For some obscure reason they are often worse in damp or wet weather, and may keep the patient awake at night, which, of course, materially enhances their chances of being confounded with " rheumatism."

Frequently, too, under this misconception they are dosed with aspirin, phenacetin, and other analgesics, which, though they may relieve their pain, is scarcely rational therapy. For the benefit procured by such means is usually transitory, and, obviously, the only way in which permanent amelioration can be assured is by the correction of any faulty posture or awkward distribution of the body-weight, or, failing this, by advising a change of occupation.

We would, therefore, urge that in all cases of rheumatism in the lower extremity the nature of a person's calling should be inquired into, and also the mechanical condition under which it is performed, as failure to appreciate the static origin of such pains is incredibly common.

(2) *The Local and Referred Pains of Flat Feet, etc.*

Speaking from experience, we have no hesitation in affirming that the non-recognition of this static deformity, and the misinterpretation of the local and remote pains associated with it, are responsible for many errors in diagnosis.

In all cases characterized by pains and aches in the lower extremities, the presence or absence of flat-foot is the first and most important point to determine. We should be particularly alive to this possibility if the person, who comes to us complaining of pains in the legs, follows an avocation involving long standing or excessive walking. For the deformity is very apt to develop in waiters, shop-assistants, servants, postmen, porters, etc. A recent pregnancy, too, or a sudden and notable increase of body-weight, is often the overlooked cause in women, and more common still in both sexes the wearing of improper footgear.

We should not be misled by the fact that flat-foot may exist for a long time without giving rise to symptoms, for frequently, as a result of some unusual strain on the plantar arch, the static disturbance in the foot enters quite *abruptly* on a painful phase.

It must not be forgotten, also, that the pain due to flat-foot is by no means always situated in the foot, but may be referred to the *peroneal, gluteal, or lumbo-sacral region.*

Quite commonly the pains complained of are situated in the calf and peroneal muscles, the origins of which at the same time are often tender to pressure, and their tendon sheaths puffy and inflamed. If to this be added the fact that considerable congestion and swelling is frequently present, we see how readily a diagnostic error may occur, and time and again have we seen it confused with sciatica or "rheumatism."

Wearing of improper boots is, as we have pointed out, a common cause, and women of the upper classes often develop pronated feet as a result of so-called French heels. In consequence thereof a disturbance of their balance ensues, and they come complaining, perhaps, not of their feet, but of their hips or back. They are troubled with a tired feeling in their gluteal muscles and a diffused tenderness along their hamstrings, which is often referred to some constitutional cause, though the prompt amelioration that follows a change of shoes clearly indicates its static origin.

Another form of referred pain, which in our experience is very commonly misinterpreted, is that of *meralgia paræsthetica*, whose relationship to flat-foot is insufficiently recognized.

One meets with it often in middle-aged individuals, who at or about the menopause have developed flat feet through increasing corpulence. The pain follows the distribution of the external cutaneous nerve of the thigh, and is accompanied often by formication or other paræsthesiæ. It is sometimes symmetrical, and its intensity varies with the severity of the flat-foot, correction of which is followed almost immediately by amelioration.

Bernhardt has observed its sudden supervention after sprains of the foot, and this appears to directly support our contention that this condition is in these instances of the nature of a *static* neuralgia. In our experience it is very commonly confused with sciatica, and its subjects for this reason not infrequently are to be seen at spas.

Both the local and remote pains of flat-foot on lying down become less or completely disappear, but they are aggravated by standing or walking. Sometimes, however, the pains, when situated in the feet, may be worse at night, and this is usually due to the fact that inflammatory changes have ensued secondarily in the tarsal joints.

In conclusion, we would emphasize the fact that in all these cases the bare feet should be thoroughly examined. A pronounced sunken arch is easily recognized, but the less obvious types of weak and everted feet call for closer scrutiny; for while sitting no sinking may be perceptible, but such feet on standing yield under the body-weight, and are more prone than rigid flat-foot to be accompanied by local as well as remote or secondary pains.

In the absence of palpable changes in shape, pain on passive inversion or adduction of the foot, with tenderness under the heel or scaphoid, usually indicates ligamentary strain.

The frequency with which one sees these patients condemned to dietetic penances and other useless and uncalled-for methods of treatment, to the exclusion of the one essential procedure—*correction of the causal static deformity*—amply justifies our somewhat lengthy digression on this point.

Hallux Valgus.

This common deformity—outward displacement of the great toe—through the local referred pain occasioned, is also a frequent source of error.

The local heat, redness, and swelling, that often ensue after slight injuries or excessive walking, render this affection very liable to confusion with "gout." Attention to the rule of always examining the bare foot will exclude the chance of such a fallacy, though it must be borne in mind that occasionally true gouty subjects present this deformity.

Metatarsalgia.

This painful condition is more often than not confused with "rheumatism or gout," and we have known subjects wander to nearly every spa on the Continent under such a misconception.

The consequences of such an error are by no means trivial, and the severity of the suffering may reduce the walking capacity to a minimum. The neuralgic pain radiates into the toes, and often upwards into the leg, usually comes on while walking, and is relieved by the removal of the boot.

An attack is sometimes precipitated by rising on the toes, in which position the metatarsals are crowded together and pressed into the sole, and so, as Mr. Robert Jones has suggested, compression of the plantar nerves results. For its detection any altered relationship in the position of the third, fourth, and fifth metatarsals—especially their depression to a lower level than normal—should be noted, and any limitation of the power of dorsal flexion of the feet likewise estimated.

The presence of *callosities under the heads of the metatarsals*, or any undue protrusion of them into the sole, are very suggestive of this painful condition.

Painful Heel.

Pain in this region affords many loopholes for misinterpretation. It may be of the nature of a *referred* pain, for, as Sir James Paget pointed out many years ago, it may be associated with *renal calculus*. In our own experience, too, it is often complained of by the subjects of *internal hæmorrhoids*, the pain waxing and waning with the variations in the rectal trouble, and only disappearing permanently when the piles have been radically treated. Similar pain in the heel is sometimes a symptom complained of in the subjects of *enlarged prostate*.

Of *local causes* there are several to be borne in mind. Thus we have known instances in which the originating cause was a bony spur springing from the under-surface of the os calcis. Or, as Lovett and Bradford have pointed out, it may be due to inflammation of the bursa under the os calcis, or be a symptom of flat-foot referable to excessive strain on the posterior insertion of the plantar fascia.

We should be careful, too, not to overlook the existence of inflammation of the bursa lying between the tendo Achillis and the posterior surface of the os calcis. The local swelling and tenderness at the site of the inflamed bursa, and its aggravation by plantar flexion of the foot, should suffice to obviate error. Very commonly such cases are traceable to violent exercise or chafing of the heel by ill-fitting boots. When met with in young men, a possible *gonococcal* inflammation of the plantar fascia may be at the root of the trouble, while in others of more mature years it may be a *gouty* manifestation.

Also it is well to remember that pain in the heel, as Tubby has pointed out, may be due to shortening of one leg or constant standing, and in rarer instances to syphilitic or tuberculous disease of the os calcis. We have dealt at such length with these various static deformities of the foot as we are convinced that anyone coming into contact with a large number of so-called "rheumatic" patients will agree that they are the unrecognized causes of much preventable suffering. Their confusion with "rheumatism and gout" is incredibly common, a fact much to be deplored in view of the futility of general measures, and the gratifying swiftness with which they respond to appropriate local procedures.

(3) *Neurasthenia.*

The subjects of this affection frequently complain of pains and aches in the lower limbs, which are distinguished by the following characters: Usually dull, wearisome, and depressing in nature, they often lead to shirking of work or exercise; present only in the day-time, they do not interfere with sleep, but reappear on rising. Of indefinite localization, they may be described as pain *en masse*, being not referred either to muscle or nerve, though occasionally to joints. When the pains are more circumscribed, *superficial pressure is painful, but deep pressure is better borne.* Vicious attitudes do not result, and muscular capacity is unimpaired. Associated symptoms, when present, will greatly aid in their differentiation from "rheumatic" pains. Diminution or disappearance of the pains during work or pleasant diversion, no less than their aggravation by unpleasant mental states, is very suggestive of neurasthenia.

Also, alternation of the pain with palpitation, headache,

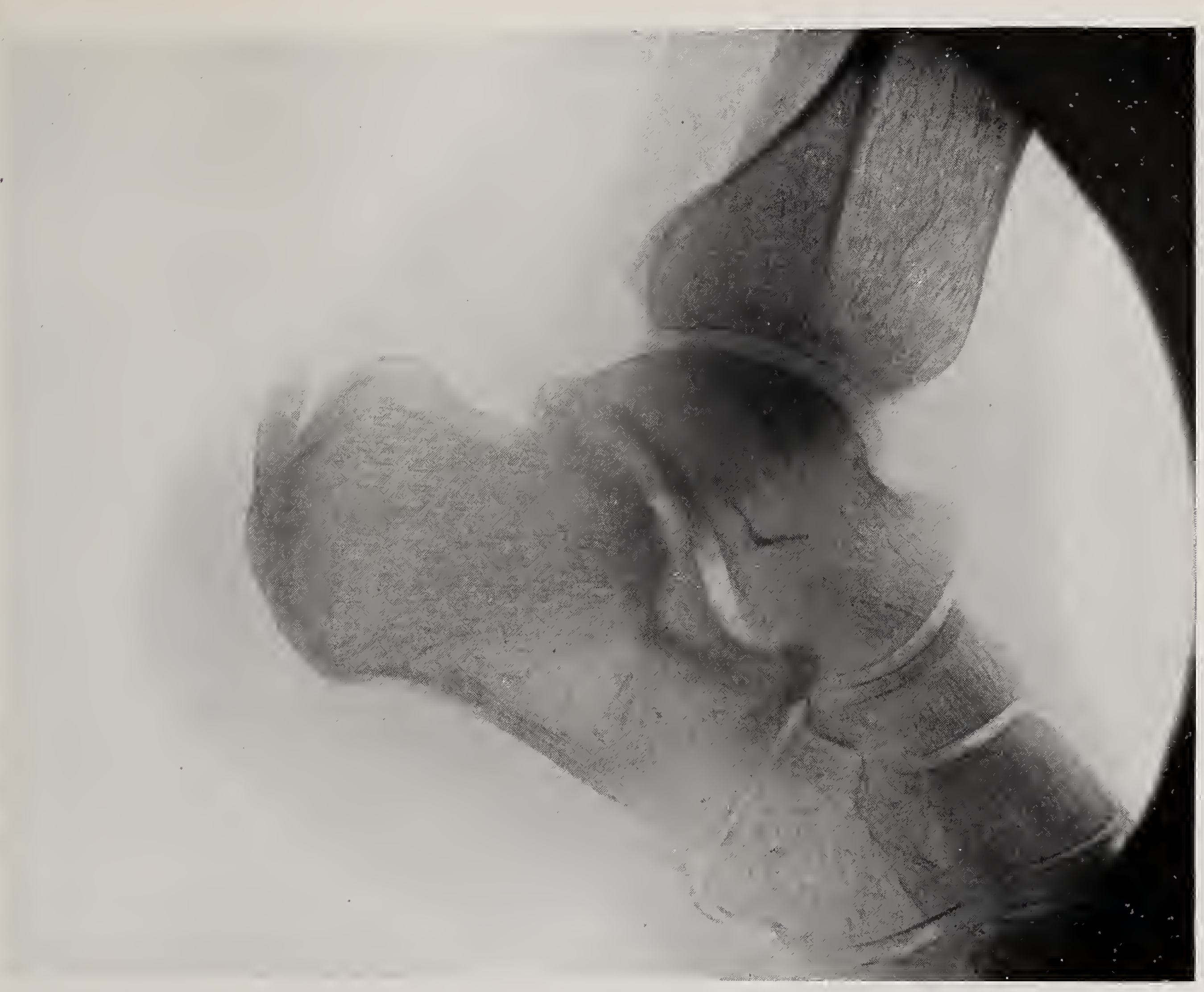


Fig. 55.—Skiagram showing calcification of the tendo-Achillis at its insertion into the os calcis.

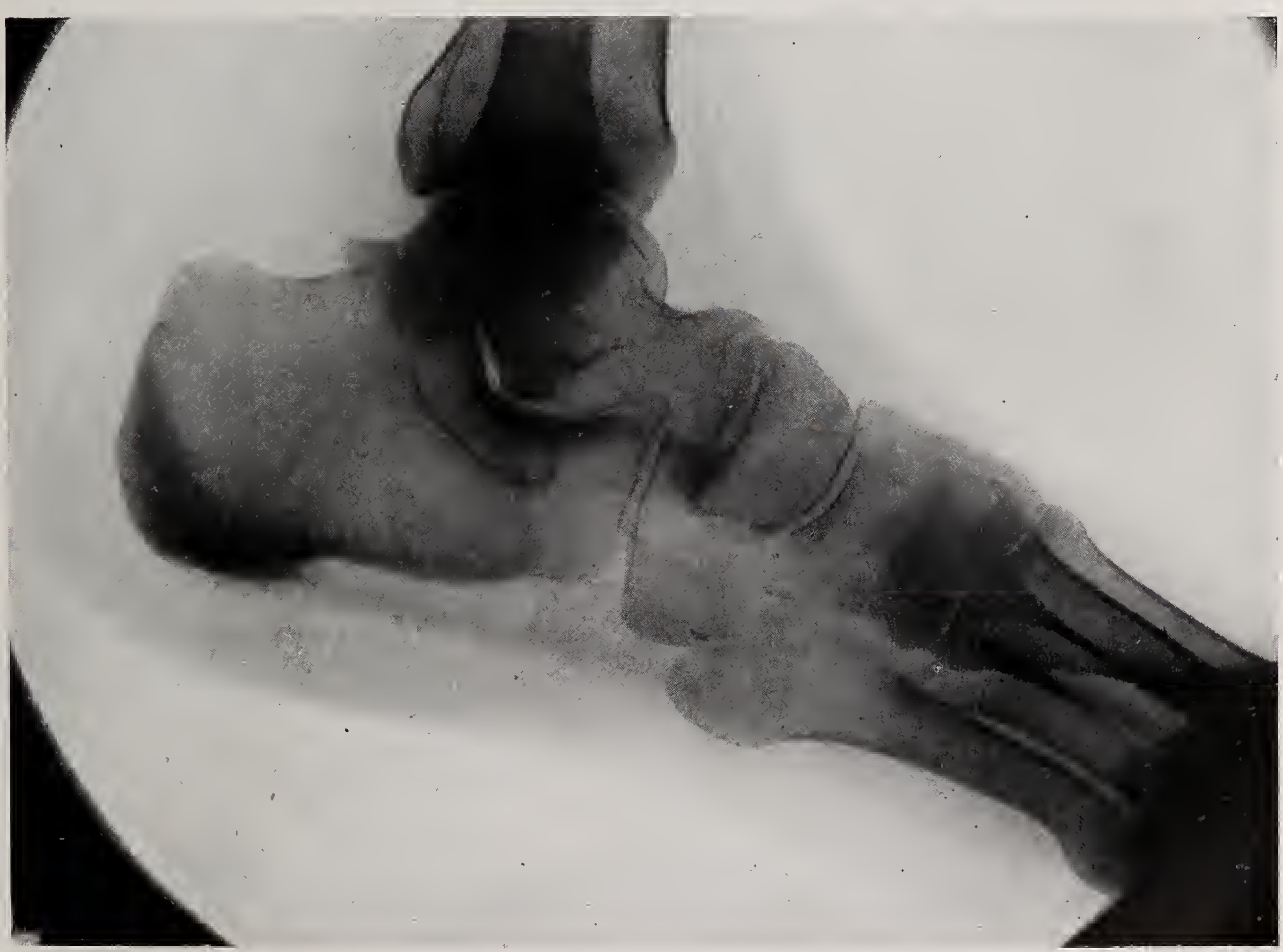


Fig. 56.—Skiagram of painful heel. Note bony spur on inferior surface of os calcis.

To face page 286.

rachialgia, or pain in other parts, will be very significant. Lastly, suspicion should be aroused if the subject is excitable, complains greatly of fatigue, and narrates very circumstantially the character of his pain, with a leaning to exaggerated or grotesque description.

(4) *Syphilitic Osteal Pains.*

The possibility of specific disease as a cause of leg pains should always be borne in mind.

The pains are usually most severe at night, and situated most frequently in the tibia, where commonly periosteal nodes are to be detected.

A history of exposure to infection, with probably a secondary exanthem and irregular slight pyrexia, will usually provide a certain clue.

(5) *Alcoholism.*

The pains are most commonly situated on the extensor surface of the limbs, and are apt to be most obtrusive in the evening, as the result of fatigue. Hyperæsthesia of the skin, *marked tenderness of the limb muscles* and possibly of the nerve trunks, together with absent knee-jerks, will, of course, be significant of multiple neuritis, especially if similar symptoms are present in the upper limbs. In doubtful cases much help will be derived from associated symptoms, morning vomiting, diarrhœa, tremor of lips, tongue, and hands, with general nervousness or unrest.

In conclusion, space precludes our dealing in detail with all sources of pain in the lower extremity, but for other possibilities of fallacy in this connection we would refer the reader to other sections, especially to that dealing with the differential diagnosis of sciatica.

Fibrositis of the Visceral Muscular Tissues.

Chronic Pharyngitis.

The muscles of the pharynx and œsophagus, as well as the fibrous elements of the myocardium, the eye or the bladder, may be the seat of fibrositis.

In chronic pharyngitis, the commonest and most generally accepted variety, the distinctive symptoms are stiffness or pain in the pharyngeal muscles. It is provoked by the acts of swallowing and speaking, and also by movements of the head and neck. The pain is not due to soreness of the mucous membranes, but is located in the muscles, and ceases when they are at rest.

The pain extends towards the ears, or upwards towards the nasal region or forehead, presumably because the morbid process extends in either of these directions.

The muscles of the neck may become slightly stiff, as in torticollis, and sometimes the glands at the angles of the jaw and below are enlarged.

The throat may appear swollen and somewhat congested, but often there are no visible changes.

Regarding the diagnosis in most cases, it is decidedly retrospective, the condition finding its explanation through some previous coincident or subsequent manifestation of fibrositis elsewhere. The course it pursues is usually benign.

Myocardial Lesions.

At a recent discussion on fibrositis at the Royal Society of Medicine, James Mackenzie made the following communication: In his experience certain heart complaints were met with in association with attacks of muscular rheumatism, and it seemed reasonable to him to infer that the cardiac muscle was involved by the same morbid process as the skeletal muscles. Because of its importance we venture to recapitulate the general features of the cardiac disturbance in such cases. These are for the most part subjective, such as distressing action of the heart on exertion or bouts of palpitation at irregular intervals. The pulse-rate is usually increased, but at other times abnormally slow, regular, or with intermissions, followed by unusually forcible beats. More rarely pain of such an intensity as to merit the designation of "angina" was present. Frequently analysis revealed delay between the auricular and ventricular systoles, and in some instances the cardiac intermissions were shown to be due to failure of the contraction stimulus to reach the ventricle. In brief, in cases of this nature all grades of partial heart-block may be detected.

Arguing from the fact that the site of the lesion in these cases of heart-block is known to be in the auriculo-ventricular bundle, Mackenzie suggests that we have proof of a definite focal lesion at this point, the nature of which he believes to be similar with those met with in the skeletal muscles when the seat of fibrositis.

Ocular and Other Forms of Fibrositis.

It has long been recognized that the fibrous textures of the eye are not infrequently attacked by "rheumatism" or fibrositis. Thus scleritis not only occurs as an isolated manifestation, but also often in association with fibrositis in other parts of the body.

Still, needless to say, we should be chary of ascribing offhand any ocular pains or disabilities to a "rheumatic" cause. For in the vast majority of such cases the pains are referable to uncorrected errors of refraction, especially astigmatism, or to conditions such as chronic glaucoma, choroiditis, etc.

The " rheumatic " form of iritis is believed by many authorities to be, relatively speaking, quite common. Nevertheless, the anomalous fact remains that iritis is practically never met in association with acute articular rheumatism.

Beaumont of Bath, who has for many years devoted special attention to the study of ocular manifestations in rheumatism, has for long maintained that many of the cases of so-called " rheumatic iritis " are but the protracted aftermath of a *gonococcal* infection. The residue of cases he believes to be due to other cocci of attenuated virulence.

As might be expected, the ocular muscles are as prone to attacks of fibrositis as those of the trunk and limbs, and " rheumatic " *ocular palsies* are by no means rare.

Thus, for example, exposure to extreme cold may at one and the same time initiate a torticollis and an ocular paralysis.

Of other forms of visceral fibrositis we may note that sufferers from " chronic rheumatism " are especially liable to *tonsillitis, rhinitis,* and *laryngitis.*

Again, Stockman has drawn attention to the fact that occasionally the fibrous tissues round the neck of the bladder may be involved. The symptoms, he says, are dull pain and increased frequency of micturition, which usually pass off in a week or thereabouts.

CHAPTER XX

MUSCULAR FIBROSITIS

Prognosis.

Discreet silence or a light and airy dismissal would appear to be the hitherto orthodox fashion of treating the question of prognosis of this disorder in current textbooks.

Doubtless to a large extent this unsatisfactory attitude was unavoidable, owing to the dearth of pathological data on which to base any intelligent conception as to the nature and probable course of the affection.

But, as we have seen, there is nothing occult or mysterious in the character of the structural lesions, which conform in their mode of production and evolution to those typical of chronic inflammatory change.

Accordingly, into our prognosis the following elements will enter. Firstly, the *constitutional or diathetic state*, whether gouty, rheumatic, or autotoxic, must be weighed and considered in the light of the results that follow efforts directed to their correction.

The *nature and extent of the anatomical lesions* produced next demand attention. Subsequently the *occupation, habits, and environmental circumstances* must be investigated from the point of view of their efficacy as exciting or contributory causes, and with this, of course, must be estimated the degree to which they admit of control or modification.

In respect of the first consideration, in cases where a *gouty taint, ancestral or acquired,* is existent, we have to reckon with a strong bias to chronicity, or at any rate a liability to recurrence.

The same is true of so-called *rheumatic* types, but here the question of chill or damp looms large, and how far the subject can be guaranteed immunity from their action will largely determine the nature of our forecast.

In both the foregoing, as well as in the types commonly regarded as autotoxic, the outlook will much depend upon how far any functional derangements, gastric, intestinal, and so forth, can be treated rationally and perseveringly in accordance with their special indications.

An undiscriminating or routine method of treatment more than anything will vitiate the outlook, as recovery under such circumstances is at best incomplete, and recurrence is but a matter of time.

The *nature and extent of the anatomical lesions* must be subjected to the most careful analysis. For in contrast to the foregoing constitutional causes, whose influence on prognosis is largely problematical or conditional on the results of therapy, in the present instance the estimation of the actual character of the existing lesions in any given case is of inestimable help in enabling us to formulate an immediate and definite prediction.

In *acute* cases, where the foci of inflammation are discrete, soft in consistence, and evidently of recent formation, swift recovery is the rule, a view which would be strongly confirmed if with the subsidence of the acute symptoms the hypertonicity of the affected muscle had disappeared. But in acute forms, as often happens, localized lesions are not detectable. We have then to rely almost entirely for our prognosis on the degree of hypertonus in the affected muscle; if excessive, so much the worse is the outlook, but if moderate in degree, the greater the likelihood of speedy disappearance.

Where, as in certain sites, the aponeurotic as well as the muscular structures are implicated, the condition is more likely to assume a chronic phase; hence the inveteracy often displayed by lumbar, gluteal, and deltoid types of fibrositis.

In established cases of *chronic* nature much will depend on the *site*, *consistency*, and *extent of the nodules* or indurations formed. In the matter of locality, those situate in the belly of the muscle are more amenable to treatment than those lying deeply in the tendinous or aponeurotic structures. Witness, for example, the greater chronicity of tendinous as opposed to muscular types of lumbago.

The degree of density of the nodules as estimated by palpation is also of determining value, as, generally speaking, the harder the induration, the more advanced the degree of sclerosis, and, therefore, the greater the difficulty of procuring its dispersal.

Still, the at one time hopeless outlook in these severe examples has been materially improved since their removal by excision has been successfully achieved. Such possible means of relief, however, are limited in their application to those instances in which the nodules are of circumscribed area and capable of accurate localization.

Those diffuse infiltrations of muscular, fascial, and subcutaneous tissues met with in cervical, gluteal, and lumbar regions are fortunately rare, but in the presence of such widespread infiltration of the fibrous tissues the outlook cannot be otherwise than gloomy.

In a disorder like muscular fibrositis, so susceptible to relapses or exacerbations under the influence of extraneous causes, it is obvious that our prognosis would be incomplete if these were left out of consideration. Into this sphere questions of immediate and remote environment enter. Thus, *continued residence in damp, ill-ventilated, and sunless dwellings*, or those situate in *low-lying alluvial areas*, or *bleak and exposed districts*, will tend to darken the prospect of swift or permanent recovery.

Occupation, too, as we have pointed out in general etiology, plays no mean part both in regard of its intrinsic nature and also of the circumstances under which it is pursued. It will be the duty of the physician to appraise the degree of its influence, and whether referable to *excessive or deficient muscular exercise*, or to these factors in combination with exposure to cold, damp, or other conditions which interfere with the due performance of muscular metabolism.

The outlook where such adverse environmental conditions obtain will obviously be somewhat dark in view of the fact that among the poorer classes they are often incapable of modification. Still, even in these cases our prognosis will be substantially brighter if the subject can be prevailed upon to refrain from those excesses, dietetic or otherwise, which make for functional derangement, and if at the same time he be mindful to avoid as far as possible exposure to atmospheric vicissitudes, such as chill, damp, and so forth.

The foregoing constitute the broad lines on which our prognosis can be determined in cases of simple, acute, and chronic muscular fibrositis. Where, however, the condition is complicated by similar changes in the joint capsules or related nerve sheaths, progress is more likely to be tardy, as, for example, where the capsule of the shoulder-joint is involved secondarily to deltoid fibrositis, or where the sheath of the sciatic nerve has been invaded by extension of a lumbo-sacral or gluteal fibrositis.

Where in long-standing cases with widespread indurations a secondary neurasthenic state has supervened, it augurs ill for the future course of the disease.

INFECTIVE OR TOXIC FIBROSITIS

(C) NEURO-FIBROSITIS, OR NEURALGIC RHEUMATISM

CHAPTER XXI

NEURO-FIBROSITIS

Historical Retrospect.

THOUGH the older authors, under the term " neuralgic rheumatism," grouped together all " painful affections following the course of the various nerves, and brought on by exposure to cold," there is little evidence in their writings that they recognized any other type than that to which they allotted the term " sciatica," or *ischiadica passio.*

Consequently, any exact historical details regarding neuralgic rheumatism practically amount to nothing more than a résumé of our knowledge regarding this particular variety—sciatica.

There is no doubt that it was one of the earlier forms to be differentiated, its recognition harking back to the time of Hippocrates, Dioscorides, and Galen. Thus, the Sage of Norwich in his " Vulgar Errors " reminds us that Hippocrates affirmed of the Scythians that, " using continual riding, they were generally molested with sciatica or hip-gout."

As far as the Middle Ages were concerned, no noteworthy contribution to the study of the affection seems to have been made by the physicians of that period; but the numerous references to it in English literature of the fifteenth and sixteenth centuries show that even the laity were quite familiar with, and by no means under-estimated, the serious disability attaching to this variety of chronic rheumatism.

Thus, in the invaluable Paston Letters (1477) we are told that one " Elizabet Peverel hath laye sek xv or xvi wekys of the seyetyke "; and in one of Skelton's works (1520) the following lament occurs: " Alasse I haue the cyatyca full euyll in my hippe."

Coming down to more recent times, we arrive at the commentary written by Cotunnius, the celebrated Neapolitan physician who flourished towards the end of the eighteenth century.

Entertaining the belief that the disorder was due to an acrid humour within the sheath of the nerve, he introduced the practices of cupping, leeching, and blistering, for the purpose of effecting its removal.

In 1841 Valleix drew attention to the superficial tender spots which are now associated with his name. Subsequently Trousseau expressed his astonishment at the facility with which the profession accepted the views propounded by Valleix, more especially as to their diagnostic importance. He somewhat caustically remarked that his experience led him to believe that Valleix was guided rather by his anatomical knowledge than his clinical facts.

Again, Lasègue, as we know, not only differentiated a benign and severe type, but also described the manœuvre by which the sensitiveness of the nerve to extension could be demonstrated—the so-called "Lasègue's sign."

But not until 1875 were the features of sciatic neuritis as opposed to sciatic neuralgia clearly differentiated, this valuable discrimination being the outcome of Landouzy's study of the affection.

The recognition of sciaticas of partial distribution we owe to Charcot, while to this author, as well as Babinski and Brissaud, we are indebted for the observation that various types of scoliosis are common secondary features of the disorder.

The sensory accompaniments of the malady were first noted by Rousset (1834) and Lagralette (1879); and important contributions followed from the hands of Phulpin and Dubarry, who first localized the exact areas of sensory disturbance.

Nor can we overlook in our own country the important work achieved by Fuller on sciatica, whose clinical descriptions as well as his shrewd observations on treatment may fairly claim to be classical.

With Sir William Gowers' masterly delineation of the affection all are familiar, and his studies of the pathology of sciatica have placed all physicians in his debt.

Lastly, our conception of the sensory troubles of this disorder have recently been greatly enlarged by the exhaustive researches of Lortat-Jacob, Berthéol, and others, who have pointed out that the zones of anæsthesia in some cases of sciatica are of root and not of trunk distribution—*la sciatique radiculaire.*

From the foregoing résumé it will be seen that our present stage of enlightenment has only been very slowly arrived at.

Of the allied affection—*brachialgia*—we find little or nothing in earlier writings; indeed, it may be said that only during the last decade or so has our knowledge of this variety attained to any measure of exactitude. This, too, is very largely due to the light shed by skiagraphy, which has enabled us to distinguish in their earlier stages those secondary types of which that variety associated with cervical rib forms the most noteworthy example.

Nomenclature.

The vague term " neuralgic rheumatism " introduced by the older authors has now become practically obsolete, though, judged in the light of the knowledge possessed by its originators, it is perhaps not more inappropriate than many other terms still current in medical terminology.

Their definition of the character of the pain as " neuralgic " is maybe misleading, but only in so far as it might be construed as implying the absence always of a neuritic process. Apart from this qualification, the term " neuralgic " is strictly applicable to the majority of cases of sciatica, brachialgia, and so forth, and, indeed, survives in the writings of contemporary authors on this subject—viz., as neuralgic fibrositis.

The use of the word " rheumatism " is doubtless the outcome of the old concept of " chill " as the main etiological factor in these neuralgic types, and this, taken together with the fact that such forms frequently alternate with, or are accompanied by, similar muscular and arthritic manifestations, and, moreover, respond to the same class of anti-rheumatic remedies, doubtless favoured this assumption as to their nature.

But, nevertheless, the results of recent investigations, we fear, do not afford much justification for the retention of the term " rheumatism " in this connection.

For the light shed on the etiology as well as the morbid anatomy clearly indicates that, while an inflammatory process in the nerve sheaths appears to be the physical substratum of the affection, this anatomical change is capable of production by many different agencies. Accordingly, the most non-committal, and therefore the most justifiable, term would appear to be *neuro-fibrositis* or *neuralgic fibrositis ;* but all the same we venture to think that it will be long before such designations supplant the older appellations " sciatica " and " brachialgia."

Albeit the propriety of retaining the word " neuralgia " in regard of this class of affections is sharply questioned by some, notably Sir William Gowers; and as a prelude to our clinical account it will be convenient here to discuss whether or no these cases are to be classed as examples of neuralgia or neuritis.

Neuralgia *v.* Neuritis.

A marked conflict of opinion prevails in regard to the criterion of discrimination between neuralgia and neuritis, and, in view of the notoriously lax manner in which these terms are bandied about, a brief digression will not be out of place.

Gowers, for example, contends that neuralgia is an extremely rare affection, most of the cases thus designated being, to his mind, examples of neuritis. He holds that the existence of *tenderness of the nerve trunk* is an infallible sign of neuritis.

Now, most of us will agree that, if this be the canon of differentiation, then there is no doubt that the proportion of cases to which the term *neuralgia* is strictly applicable form but a negligible minority.

On the other hand, Oppenheim, commenting on the difficulty in discriminating, for example, between sciatic neuralgia and sciatic neuritis, arrives at the conclusion that a sharp-cut distinction is practically inachievable.

He fully admits that examples of true sciatica—viz., neuritis—do occur; but in his experience such are comparatively rare, and of the larger number of cases it may be said that they represent varying grades, transitional, as it were, between neuralgia and an avowed inflammatory nerve change—viz., neuritis.

Our own clinical observations distinctly support Oppenheim, in that, in the vast bulk of examples of so-called "sciatica," those objective motor and sensory phenomena usually associated with a neuritic process are often slight, and very commonly lacking.

We speak emphatically on this score, for we have been at much pains to gather evidence at first hand on this point. To our mind, therefore, it seems desirable that the term "neuritis" should be restricted in its usage to those instances marked by muscular atrophy, sensory disorders, and trophic phenomena, reserving that of neuralgia for those in which such objective changes are wholly absent.

At the same time we are fully conscious that every now and then cases crop up which cannot with any certainty be definitely classed as neuralgic or neuritic, and here the application of either term will be largely a matter of the physician's personal equation.

The inconstancy, too, of the pathological findings indicates that the dividing-line between neuralgia and neuritis is not a sharply defined one. Indeed, these as well as the clinical phenomena undoubtedly suggest that cases primarily neuralgic in nature may by imperceptible gradations, under certain conditions, develop into states of neuritis and perineuritis.

With this reservation as to the occurrence of transitional forms, we are of opinion that all examples not exhibiting definite objective changes should be classed as neuralgic, and judged by this criterion the vast majority will, we venture to think, fall within this category.

CHAPTER XXII

SCIATICA

Etiology.

In this present section the term "sciatica" will be used in its broader sense, as including not only sciatic neuralgia, but also neuritis of this nerve trunk.

We do so, inasmuch as it would be vain on our part to attempt a practical differentiation of the etiological factors of these two varieties of sciatic pain.

For, as a matter of clinical experience, the same agencies may at one time originate simply neuralgic symptoms, at another the graver phenomena of neuritis, and so, to obviate useless reiteration, we shall consider them simultaneously.

We shall in the first instance deal with the etiological factors of *primary* sciatica, in which the painful affection of the nerve is due to *intrinsic causes of diathetic, infective, or toxic nature.*

Primary Sciatica.

Predisposing and Proximate Causes.

Age and Sex Incidence.—Its victims belong for the most part to the middle decades of life, the male sex markedly predominating—a peculiarity distinctly confirmatory of Bernhardt's dictum that, taken as a whole, neuralgias are more common in men than in women.

But for more detailed consideration of its incidence in the various decades of life, we would refer the reader to the section on general etiology.

Limb Incidence.—With regard to the relative incidence in either limb of the two sexes, it was found that in a series of 500 cases in which the sciatic nerve alone was affected the following data were arrived at:

MALES.			FEMALES.		
Left.	Right.	Double.	Left.	Right.	Double.
185	181	38	47	38	11

This would give for an aggregate of 500 in both sexes the percentage of 46·4 affecting the left leg, 43·8 right leg, and 9·8 for double sciatica.

Thus, it follows from this series that the left is more often attacked than the right.

In another series of 250 cases the sciatica was preceded by lumbago, and the results obtained were as follows:

MALES.			FEMALES.		
Left.	Right.	Double.	Left.	Right.	Double.
83	78	41	20	19	9

From this it will be seen that, out of 250 cases, lumbago was associated with double sciatica in 50 cases, or 20 per cent., more than double the percentage in simple or uncomplicated sciatica.

Out of 250 cases in both sexes, the left limb was affected in 103, or 41·2 per cent., and the right in 97, or 38·8 per cent.

Occupation.—The intimate bearing of this on the etiology of sciatic pain has been previously dealt with, and we need only indicate briefly here the varied nature of the influence it exerts.

In some callings its onset is referable to exposure and damp, but in other instances it seems more definitely related to the actual nature of the occupation, as predisposing to overextension or prolonged compression of the nerve trunk.

Thus, in masons, labourers, and such-like, cold and damp seem more potent; while in colliers and porters undue traction on the nerve, and in clerks, etc., external pressure, in consequence of their sedentary occupation, seem to favour its development.

Neuropathic Inheritance.—These subjects more than any other type are especially prone to suffer from neuralgic manifestations, and some of the most inveterate cases of sciatica arise in those of neurotic heritage. Oftentimes in such an exhausting illness—especially if entailing loss of blood—bequeaths a tendency to sciatica, and, like other neuralgias, it frequently makes its appearance during the stormy period of the climacteric.

Gout.—Whatever be the exact nature of the relationship, there is no question as to the extraordinary frequency with which the subjects of sciatica are of gouty habit or heritage.

The sthenic florid type of gouty person seems more liable to develop the affection, and, though occasionally transient and benign, it more commonly displays a marked tendency to chronicity.

While some may present definite stigmata of gout, or have suffered from articular outbreaks, in others, lacking these frank avowals, ancestral evidence of such a taint is present, and apparently this constitutional tendency often determines the onset of sciatica at an unusually early age.

Senility and Arterio-Sclerosis. — Premature senescence and arterial disease distinctly predispose to the development of these as well as other forms of neuralgia, and Doumer and Lemoine lay stress, too, on the frequency with which arterial hypertension runs side by side with sciatica.

Diabetes and Other Toxic Causes.—That grave disease, diabetes, so fertile a source of neuralgias elsewhere, must not be overlooked as a cause—though relatively infrequent—of sciatic pain. It displays a remarkable tendency to be bilateral, while the pains are often very severe and obstinate.

Alcoholism, and poisoning by lead, mercury, and carbon dioxide have also been cited as occasional etiological factors in sciatica.

Infections.

These, presumably through the irritating action of their toxins, are also causes—probably under-estimated in frequency—of sciatica.

Thus, examples are on record of the development of sciatica in the course of acute articular rheumatism, typhoid fever, pneumonia, and also in puerperal infections. But such are extremely rare, and the infections most frequently cited in this connection are those of syphilis, gonorrhœa, and malaria, with as a rare event tuberculous infection.

Syphilis.—That sciatic pain may be one of the protean manifestations of syphilis has long been held, and recent researches appear to indicate that its frequency is under-estimated.

Gowers, however, held it rare as a cause, and remarks that it is difficult, even when present, to exclude the possible influence of gout. Gibson and Fleming, too, maintain that syphilis is not a common etiological factor, and when in its course sciatic pains do develop, they are usually referable to a primary meningeal or cord lesion.

Fournier, however, has for long insisted that sciatica is by no means an uncommon accompaniment of the secondary and tertiary phases of this affection. Indeed, he states that, next to the cephalic variety, sciatic neuralgia is the most common manifestation of this nature.

Gonorrhœa.—In keeping with their marked affinity for fibrous tissues, the toxins of the gonococcus sometimes attack the fibrous sheaths of the nerves. This is strongly indicated by the fact that cases of gonorrhœal arthritis are sometimes complicated, not only by lumbar fibrositis, but also by actual sciatica.

But apart, however, from arthritic manifestations of this nature, sciatic pains sometimes arise during the acute stages of gonorrhœa, while the subjects of chronic gleet are occasionally afflicted in the same way.

The pathogeny of these gonorrhœal sciaticas is somewhat uncertain, save in the cases where there are accompanying joint changes; but in such instances of marked systemic infection it seems reasonable to suppose that lesions, similar to those produced in the periarticular or synovial tissues, are present in the sheaths of the peripheral nerves.

It is, indeed, somewhat singular that gonorrhœa as a cause of sciatica should have been for so long overlooked, seeing how faithfully both the arthritic and muscular manifestations of so-called " chronic rheumatism " are reproduced in this affection.

Recorded examples, however, of gonorrhœal sciatica are steadily accumulating, and we would lay stress on more attention being paid to gonorrhœa as a cause of sciatica, as not a few of these subjects give a history of such infection.

Malaria.—It is claimed that, if we except facial neuralgia, the sciatic variety is the most commonly met with in this affection, and Hertz regards it as a larval form of this disease. It must, however, be added that, in the opinion of some authorities, it is a very unusual manifestation of malaria.

Tuberculosis.—We are all familiar with the fact that sciatic pain may ensue secondarily to tuberculous disease of the vertebræ contiguous to the origin of the sciatic trunk.

Recently, however, certain French physicians, more particularly Lortat-Jacob, have pointed out that sciatica may precede all other tuberculous manifestations; hence their term *pretuberculous sciatica.*

Landouzy has reported an interesting case in a youth, aged twenty years, in whom, without special hereditary antecedents, the following events occurred: Suddenly, without apparent cause, he developed a right-sided sciatica, followed by atrophy of the same limb. Four months after the onset he developed pulmonary tuberculosis, to which he succumbed, the whole illness from onset to death lasting under six months.

A case, possibly open to the same interpretation, is now under our care, in which, after a sciatica of some twelve months' standing, the subject, a man of thirty-five, has developed signs of tubercle in the right apex.

But be this as it may, the paucity of the recorded examples precludes any dogmatic statement as to this suggested association of tuberculous disease and sciatica.

In conclusion, it must be admitted that, even granting the fullest range of incidence to these various specific infections, yet they can but account for a tithe of the total cases of sciatica. But evidences of *gout* are undoubtedly frequently met with, and we are inclined to believe that this disorder, through the medium of its *associated gastric and intestinal derangements*, does in some way favour the occurrence of *subinfection*, and so accounts for the genesis of the majority of cases.

The foregoing constitute the chief *primary* causes of sciatica, and we shall now pass on to consider those examples in which the disorder ensues secondarily to influences outside the nerve.

Secondary Sciatica.

Extrapelvic Causes.

Trauma.—Sciatica may arise as a consequence of direct injury, blows, or falls upon the hip or buttock. In rarer instances an acute sciatic neuritis develops as a result of intramuscular injections of mercurial salts into the buttock; and Lortat-Jacob and others have noted the occurrence of sciatic neuralgia and neuritis in sequence to penetrating wounds.

External Pressure.—More commonly, however, it supervenes in sequence to superficial and prolonged compression of the nerve trunk.

In those predisposed, and who at the same time follow sedentary occupations, there is little doubt that mechanical pressure by the edge of a chair can excite an attack, and most certainly it can determine a recrudescence of the affection when once established.

The same result is sometimes directly attributable to muscular action, the nerve being suddenly compressed in its course along the back of the thigh by violent contraction of the contiguous muscles.

While it is doubtful if such can be an originating cause, there is none as to its power of evoking a fresh outbreak of pain in an already affected nerve.

Again, *overextension of the nerve trunk*, as in occupations involving frequent rising and stooping, is, we believe, a potent contributory cause. But, in all probability, all these mechanical factors, though they may excite the disease, more often co-operate with other influences predisposing to infection or toxic absorption.

Osteo-arthritis of the hip is frequently attended by sciatic pain.

While a true sciatic neuralgia may result reflexly from disease of this nature in the hip, it may also take the form of a true pressure sciatica due to impingement of osteophytic outgrowths.

In addition to the foregoing secondary sciaticas, we have that large group of cases in which sciatica supervenes in sequence to *gluteal or crural types of fibrositis.*

Lastly, we have always to bear in mind those types of sciatic pain which are referable to *static* causes, of which the most noteworthy is a condition of flat-foot.

Intrapelvic Causes.

A fibrositis of the sheath of the sciatic trunk often develops in sequence to persistent irritation or pressure upon either the nerve trunk or its cords of origin. In all these sciaticas of intrapelvic source the symptoms may be due partly to the direct effect of pressure, partly to the inflammation provoked by it, and in some instances to direct extension of some morbid process lying in contiguity.

The anatomical relationships of the nerve and its roots are particularly favourable to such contingencies, and this readily accounts for the fact that *sciatic pain is often the first symptom of increased intrapelvic pressure.*

Fuller in his classical work states his conviction that an accumulation of fæces in the caput coli often gives rise to right-sided sciatica. Whether or no the presence of fæcal masses in colon or rectum is a sufficient cause is open to question, but we are convinced of its power to aggravate an established case.

Again, it may be a manifestation of *pregnancy* due to pressure by the enlarged uterus. The pain is more marked in the earlier months, and often disappears as the uterus rises out of the pelvis.

Also a difficult labour, by compression, may be responsible, but it is probable that in some of these puerperal cases an infective element plays its part.

More important, however, are the sciaticas which are, so to speak, symptomatic of *intrapelvic neoplasms.* In our experience we have known it a prominent symptom of malignant and fibroid growths of the uterus, and also of an ovarian cyst.

We have also seen it complicate carcinoma of the rectum and simple and malignant enlargement of the prostate, while of other intrapelvic causes of sciatic pain may be mentioned pelvic aneurysms, cysts in the broad ligaments, retro-uterine hæmatocele, pelvic abscesses, and enlarged glands.

Sciatica which is secondary to intrapelvic growth may be of either *chronic* or *acute* character. In the former instance the symptoms are due merely to pressure by the contiguous neoplasms, but in the latter this mechanical factor has gone farther and excited an actual neuritis.

While it is highly important to bear in mind all the foregoing as causes of *pressure sciatica*, we would especially single out *rectal* disorders; for not only growths in this region, but also internal hæmorrhoids and fissure of the anus, not infrequently occasion sciatic pain.

In this connection, too, we would emphasize the sciatic pain which ensues secondarily to *engorged and varicose conditions of the intrapelvic veins*, especially those entering into direct relation with the sciatic sheath.

Having met with many examples of this nature, which in certain of its features is very distinctive, we have devoted a later section to consideration of this *varicose* variety of sciatica.

We would also draw attention to appendicitis as being sometimes a cause of sciatic pain. We have known the onset of *acute appendicitis* to be announced by acute sciatica, which increased *pari passu* with the intensity of the primary disorder until the latter had been treated by operation, when it promptly disappeared.

We have also observed its development after removal of an inflamed appendix, when it may prove of very obstinate nature. In such instances it is presumably the outcome of an extension of the inflammatory process, with subsequent adhesions involving the intrapelvic portion of the sciatic nerve sheath.

Apropos of this appendicular type of sciatica, if we may judge from the growing number of examples recorded in literature, the foregoing are not isolated cases.

Of more definitely intrapelvic inflammatory processes, it may be mentioned that *perimetritis* rather than parametritis is the more frequent cause of sciatica.

It now only remains for us to allude to *disease of the pelvic bones* in relation to sciatic neuralgia and neuritis. Thus, an outgrowth of callus secondary to a fracture may compress the nerve at the level of the sciatic foramen, or pressure may be exerted upon it by growths springing from the pelvic bones.

Again, the presence of disease in one or other sacro-iliac synchondrosis is often detected through the sciatic pain it so frequently gives rise to.

We have seen three instances in which it was the first intimation of tuberculous disease at this site, and more commonly than is thought we meet with it as a feature of osteo-arthritis of the same articulation, and the same is true of that disorder known as *relaxation of the sacro-iliac ligaments.*

Lastly, *tuberculous or malignant disease of the lumbar column* or meninges may involve the nerve roots of the sciatic nerve trunk, and so give rise to a radicular type of sciatica.

Lortat-Jacob, who has paid much attention to this variety, claims that, of the various causes, in order of frequency, Pott's disease comes first, then vertebral cancer, meningeal tumours, and lastly chronic spinal meningitis, which may be of syphilitic, tuberculous, or gonorrhœal origin.

Bilateral Sciatica.

Sciatic neuralgia or neuritis is in the vast majority of instances unilateral, but symmetrical sciatic pain sometimes supervenes in sequence to *tumours of the spinal cord, sacrum, or pelvis.*

Or it may be due to a lesion of the nerve roots, the cauda equina, or of the spinal cord, and in addition, it may be the expression of some constitutional disease, especially *diabetes ;* but judging from our own series this is a rare event, amounting to only 2 per cent.

Exciting or Determining Causes.

We have in the foregoing sections considered what may be termed the essential or proximate etiological factors of primary and secondary sciatica.

It is now necessary for us to refer briefly to the exciting causes of sciatic pain, and the action of these, of course, is more evident in the case of the *primary* sciaticas of diathetic, infective, or toxic nature.

There is nothing distinctive in these aggravating or exciting agencies, which are precisely similar to those which prove most effectual in other forms of fibrositis.

Exposure to cold is perhaps the most common, which may take the form of a general chill, or more often one of local exposure such as sitting on wet grass, standing in water or in damp boots.

Other factors are excessive muscular exertion or prolonged sitting on improper chairs, or in a faulty posture involving overextension or compression of the nerve trunk.

In addition must be noted constipation and functional digestive derangements which undoubtedly in this, as in other types of fibrositis, are potent causes of relapses or exacerbations.

Classification.

The morbid anatomy of sciatica having been already considered in the previous section dealing with the anatomical characteristics of neuro-fibrositis, we are now in a position to proceed to the clinical account of this particular variety.

But before doing so it will, we think, be advisable to deal with the various attempts at differentiation of the clinical types of sciatica.

According to Gowers, two clinical varieties of sciatica can be distinguished:

1. *Primary,* in which the pain is to be regarded as the expression of an inflammatory process implicating chiefly the connective-tissue elements.
2. *Secondary,* in which the morbid process is initiated in the nerve by primary disease in its immediate vicinity.

Gibson and Fleming, on the other hand, recognize three types:

1. *True neuralgia* of the nerve and its branches.
2. *Pressure sciatica,* due to intrapelvic growths and other causes.
3. *Sciatic neuritis,* which to their minds constitutes the ordinary form.

French writers, more particularly Lortat-Jacob and Saberéanu, distinguished two main groups:

1. *Trunk sciatica,* subdivided into neuralgic and neuritic types.
2. *Root sciatica,* or *la sciatique radiculaire,* of which they recognized neuralgic and neuritic varieties.

For ourselves, fully conceding the unavoidable arbitrariness of all suggested classifications, we shall consider sciatica under three main headings:

1. Sciatic neuralgia.
2. Sciatic neuritis.
3. Radicular sciatica.

We shall adopt Gowers' main divisions of (1) *primary,* (2) *secondary* sciatica, accepting that authority's interpretation of these terms.

As subdivisions of these, the following seem to us the most convenient *anatomico-clinical* types:

(1) Trunk sciatica of *unilateral* distribution, including—

(*a*) Sciatic neuralgia.
(*b*) Sciatic neuritis.

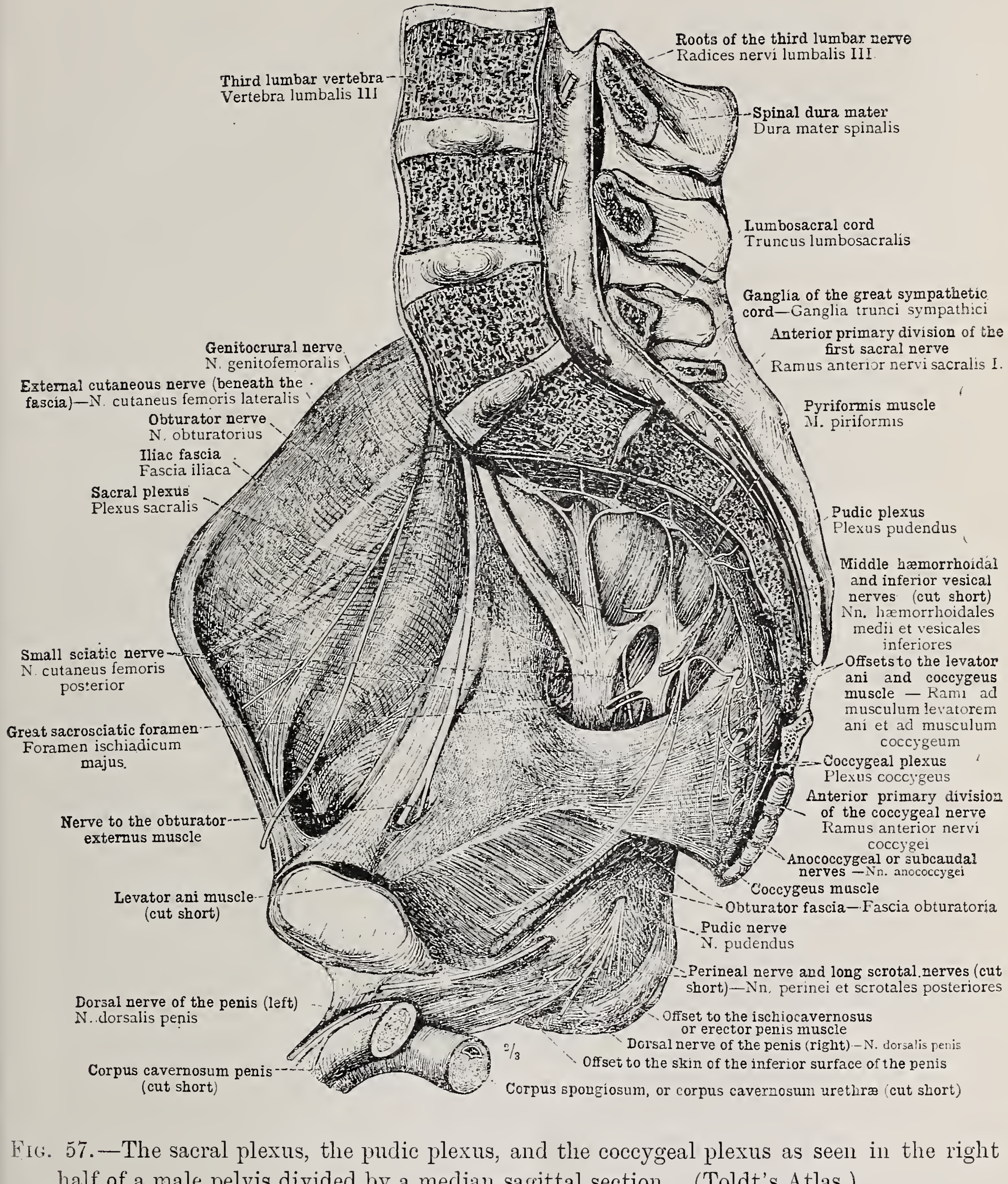

Third lumbar vertebra
Vertebra lumbalis III
Genitocrural nerve
N. genitofemoralis
External cutaneous nerve (beneath the fascia)—N. cutaneus femoris lateralis
Obturator nerve
N. obturatorius
Iliac fascia
Fascia iliaca
Sacral plexus
Plexus sacralis
Small sciatic nerve
N. cutaneus femoris posterior
Great sacrosciatic foramen
Foramen ischiadicum majus.
Nerve to the obturator externus muscle
Levator ani muscle (cut short)
Dorsal nerve of the penis (left)
N. dorsalis penis
Corpus cavernosum penis (cut short)
Roots of the third lumbar nerve
Radices nervi lumbalis III
Spinal dura mater
Dura mater spinalis
Lumbosacral cord
Truncus lumbosacralis
Ganglia of the great sympathetic cord—Ganglia trunci sympathici
Anterior primary division of the first sacral nerve
Ramus anterior nervi sacralis I.
Pyriformis muscle
M. piriformis
Pudic plexus
Plexus pudendus
Middle hæmorrhoidal and inferior vesical nerves (cut short)
Nn. hæmorrhoidales medii et vesicales inferiores
Offsets to the levator ani and coccygeus muscle — Rami ad musculum levatorem ani et ad musculum coccygeum
Coccygeal plexus
Plexus coccygeus
Anterior primary division of the coccygeal nerve
Ramus anterior nervi coccygei
Anococcygeal or subcaudal nerves —Nn. anococcygei
Coccygeus muscle
Obturator fascia—Fascia obturatoria
Pudic nerve
N. pudendus
Perineal nerve and long scrotal nerves (cut short)—Nn. perinei et scrotales posteriores
Offset to the ischiocavernosus or erector penis muscle
Dorsal nerve of the penis (right)—N. dorsalis penis
Offset to the skin of the inferior surface of the penis
Corpus spongiosum, or corpus cavernosum urethræ (cut short)
2/3

FIG. 57.—The sacral plexus, the pudic plexus, and the coccygeal plexus as seen in the right half of a male pelvis divided by a median sagittal section. (Toldt's Atlas.)

(2) Trunk sciatica of *bilateral* distribution, with the same subdivision into neuralgic and neuritic forms.

(3) Incomplete or *partial* sciatica, in which the morbid process is limited to some offshoot of the main trunk, and of which three main forms may be distinguished:

(*a*) Peroneal or external popliteal.
(*b*) Tibial or internal popliteal.
(*c*) Plantar.

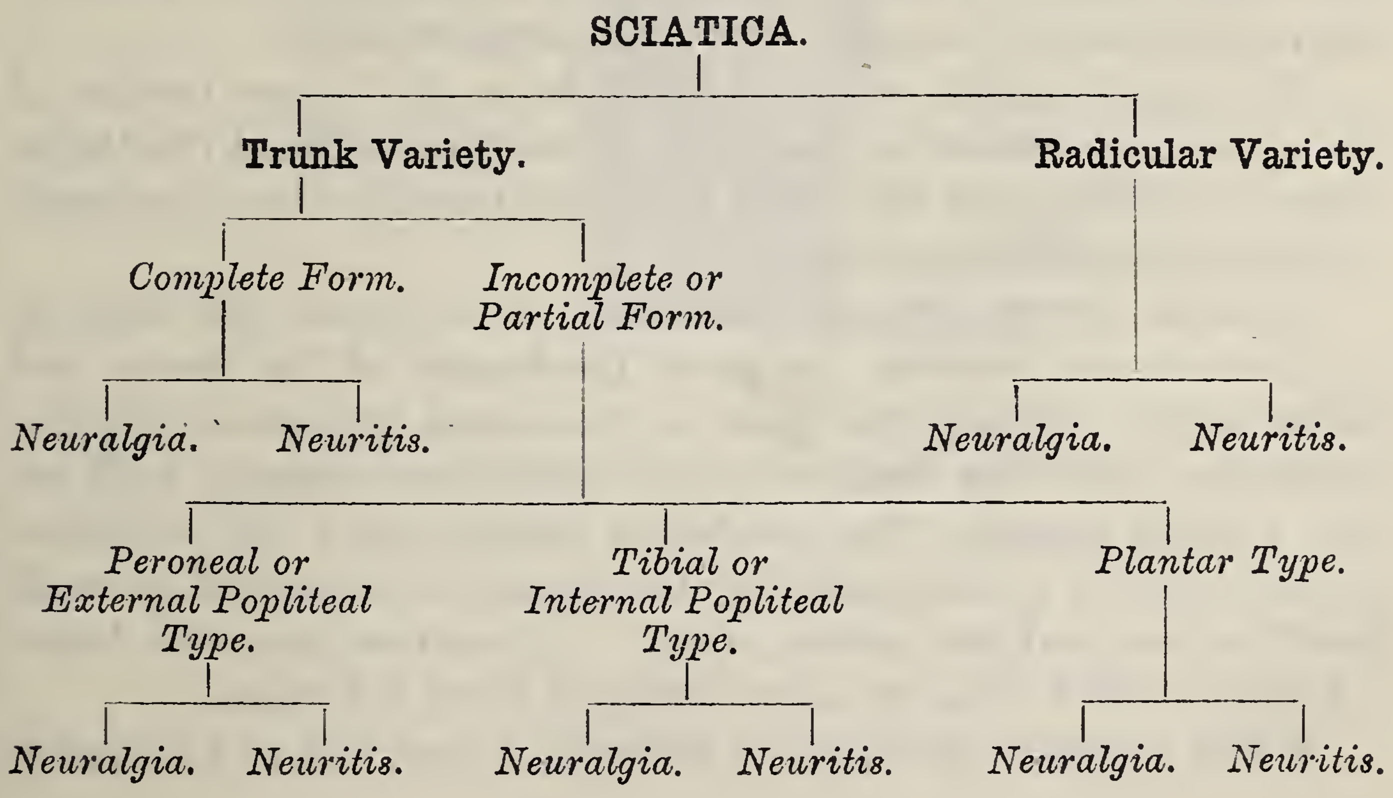
(4) Radicular sciatica, in which the morbid process is localized to the nerve roots.

Apart from these anatomically differentiated types, there are certain varieties of sciatica which, partly by reason of their more definite etiology, and partly because of their distinctive features, seem to call for individual notice.

(*a*) Diabetic sciatica.
(*b*) Gonorrhœal sciatica.
(*c*) Varicose sciatica.
(*d*) Hysterical sciatica.
(*e*) Spasmodic sciatica (Brissaud).

In concluding our classification, it will be noted that our differentiation is, as stated before, largely determined on anatomico-clinical grounds, if we except those types in which an exact etiology appears to be established, such as the gonorrhœal and diabetic types of the disorder.

The appended table will perhaps render clearer our attempt at differentiation of these various types. It will further simplify the matter if we state that any individual one of the several varieties enumerated may be primary or secondary.



Having regard to the largely anatomical basis of our classification, it will be somewhat opportune if we now proceed to a short description of the origin, course, distribution, and relationship of the sciatic nerve, as otherwise it will be quite impossible to appreciate its varied symptomatology.

Anatomical Relationships of Great Sciatic Nerve.

The great sciatic nerve (nervus ischiadicus), the largest nerve in the body, is a continuation downwards of the main part of the sacral plexus. The sacral plexus results from the blending of the lumbo-sacral cord (this resulting from the junction of the fifth and part of the fourth lumbar), the ventral primary divisions of the first three and part of the fourth sacral nerves.

These several nerves unite to form an upper large or sciatic band and a lower small cord or band.

The sciatic band is formed by the junction of the lumbo-sacral cord, the first, second, and the greater part of the third sacral nerves.

The sciatic band proceeds downwards and outwards to the lower part of the great sacro-sciatic foramen, and here, much reduced in width and rounder in shape, it enters the gluteal region below the level of the pyriformis muscle as the great sciatic nerve.

In its course through the pelvis it rests on the anterior surface of the sacrum and pyriformis muscle. Its anterior surface is in close relation with some of the pelvic veins, to an engorged condition of which one form of sciatica can be traced.

Lying as it does in contiguity to certain branches of the internal iliac artery, not only may aneurysm of these vessels, but also sciatic hernia, pelvic tumours, and accumulation of fæces in the rectum, cause neuralgia of this important trunk.

The great sciatic nerve extends from the lower border of the pyriformis muscle to somewhat below the middle of the thigh, where it divides into the tibial or internal popliteal and peroneal or external popliteal nerves.

Covered by the gluteus maximus, it traverses the buttock in the interval between the great trochanter of the femur and tuber ischii. During this part of its course it rests on the innominate bone, the tendon of the obturator internus with its two gemelli muscles, the quadratus femoris, and the adductor magnus, and is accompanied by the posterior cutaneous or small sciatic nerve and the sciatic artery. It receives from the latter a branch, which runs for some distance in its substance.

While coursing through the buttock, it does not as a rule give

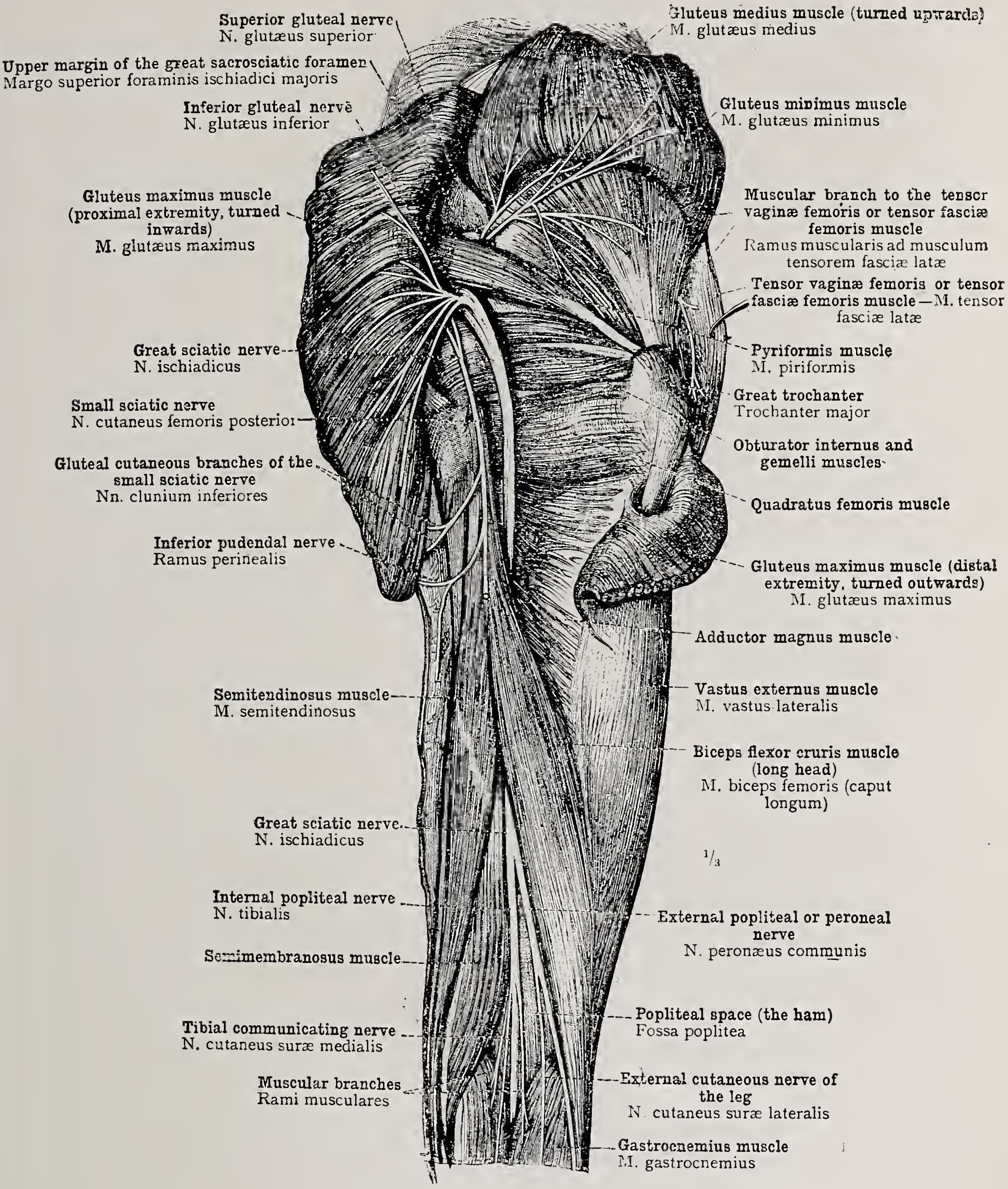

Superior gluteal nerve
N. glutæus superior
Upper margin of the great sacrosciatic foramen
Margo superior foraminis ischiadici majoris
Inferior gluteal nerve
N. glutæus inferior
Gluteus maximus muscle (proximal extremity, turned inwards)
M. glutæus maximus
Great sciatic nerve
N. ischiadicus
Small sciatic nerve
N. cutaneus femoris posterior
Gluteal cutaneous branches of the small sciatic nerve
Nn. clunium inferiores
Inferior pudendal nerve
Ramus perinealis
Semitendinosus muscle
M. semitendinosus
Great sciatic nerve
N. ischiadicus
Internal popliteal nerve
N. tibialis
Semimembranosus muscle
Tibial communicating nerve
N. cutaneus suræ medialis
Muscular branches
Rami musculares
Gluteus medius muscle (turned upwards)
M. glutæus medius
Gluteus minimus muscle
M. glutæus minimus
Muscular branch to the tensor vaginæ femoris or tensor fasciæ femoris muscle
Ramus muscularis ad musculum tensorem fasciæ latæ
Tensor vaginæ femoris or tensor fasciæ femoris muscle—M. tensor fasciæ latæ
Pyriformis muscle
M. piriformis
Great trochanter
Trochanter major
Obturator internus and gemelli muscles
Quadratus femoris muscle
Gluteus maximus muscle (distal extremity, turned outwards)
M. glutæus maximus
Adductor magnus muscle
Vastus externus muscle
M. vastus lateralis
Biceps flexor cruris muscle (long head)
M. biceps femoris (caput longum)
1/3
External popliteal or peroneal nerve
N. peronæus communis
Popliteal space (the ham)
Fossa poplitea
External cutaneous nerve of the leg
N. cutaneus suræ lateralis
Gastrocnemius muscle
M. gastrocnemius

Fig. 58.—The course of the great sciatic nerve from the gluteal region down the back of the thigh, and its division into the internal popliteal and the external popliteal nerves. (Toldt's Atlas.)

To face page 310.

off any branches, but occasionally supplies one or more branches to the hamstring muscles as high as the quadratus.

In its passage down the thigh it rests on the adductor magnus, and is covered by the long head of the biceps.

The larger of the two divisions, *the internal popliteal nerve*, enters the popliteal space, issuing from under the cover of the biceps muscle, and, running vertically downwards, bisects this space longitudinally. At the lower border of the popliteus muscle, where it passes into the posterior tibial nerve, it gives off cutaneous, muscular, and articular branches.

Its cutaneous branch arises about the middle of the popliteal space, and runs down in a furrow between the two heads of the gastrocnemius to join a similar branch from the external popliteal, their union a little below the calf of the leg forming the *external saphenous* or sural nerve.

The muscular branches supply both heads of the gastrocnemius, soleus, plantaris, and popliteus.

The *external popliteal*, the smaller of the two branches of the greater sciatic, descends along the outer side of the popliteal space and internally to the biceps tendon.

Subsequently it passes down between the outer head of the gastrocnemius and the biceps, and finally, encircling the head of the fibula, ends under cover of the peroneus muscle by dividing into the *anterior tibial* and *musculo-cutaneous* nerves.

At this point it gives off cutaneous branches and articular branches. The former are two in number, one to the skin on the anterior and outer aspect of the leg in its upper part, and the other a communicating branch to join with a similar offset from the internal popliteal to form the sural or *external saphenous nerve.*

The *posterior tibial* supplies the muscles of the sole of the foot, the bones and vessels of the leg, the ankle and joints of the foot, as well as the skin covering the plantar aspect of the toes, sole of the foot, and in part that of the lower half of the back of the leg.

The *anterior tibial* in its path down the front of the leg and foot supplies branches to the muscles of the front of the leg as well as the extensor brevis and peroneus tertius and the articulations of the foot.

The *musculo-cutaneous* as it courses down the outer side of the leg supplies branches to the peroneus longus and brevis as well as cutaneous branches to the outer side of leg and dorsum of foot.

CHAPTER XXIII

TRUNK SCIATICA: CLINICAL ACCOUNT OF SCIATIC NEURALGIA AND SCIATIC NEURITIS

In sciatic neuralgia there are no evidences of change in the connective-tissue sheath of the nerve, but in sciatic neuritis the neurilemma, with its interstitial prolongations, is the seat of an inflammatory change.

In the latter instance the pathological changes may be localized to particular regions, or they may extend more or less diffusely throughout the course of the sciatic nerve.

Before proceeding to a detailed consideration of the symptomatology, it will, we think, be wise to attempt a brief essay of the salient features and course of (1) sciatic neuralgia and (2) sciatic neuritis.

Sciatic Neuralgia.

Clinical Account.

Of all the various neuralgias collectively regarded, the intercostal form is reputed to be the most common, and next in order of frequency comes sciatic neuralgia.

Mode of Onset.—The *initial* attacks of pain may be absolutely *sudden* in their oncoming, vanishing again with the same startling abruptness. But when established, the patient is usually made aware of an approaching paroxysm by some warning sensation of numbness, pricking, or vague discomfort.

But in instances where the condition is secondary to gluteal fibrositis—viz., compression by a nodule—pain and aching of variable extent and duration in the buttock will have preceded the onset of neuralgic pain referred definitely to the sciatic trunk.

Features of Paroxysm.—With or without prodromal paræsthesiæ, the patient is seized with pain in the sciatic region, variously described, sometimes as superficial, at other times as deep-seated.

In the former instance it may be compared to red-hot needles, lightning, or to sensations of pricking, stabbing, burning, and so forth; but in the latter case it assumes a more massive character of a crushing, tearing, grinding, or boring feeling.

While the foregoing expressions of agonizing pain are applicable to many cases, it is not always so, for it may be of quite moderate intensity, amounting occasionally to but a slight feeling of uneasiness.

When in the grip of a paroxysm, like a " bolt from the blue," fitful, fugitive pangs shoot down the limb, and occasionally dart upwards in the reverse direction.

At first the pain may not be severe, and ceases swiftly, coming and going every few seconds or minutes; but as it gathers strength the periods of remission grow shorter and shorter, wave after wave traversing the limb until the suffering appears almost incessant. At length comes a respite, and then the dreaded recurrence, and these may alternate for a few minutes or as many hours. With the decline of the paroxysm the intensity of the pain abates, the intervals of repose lengthen, and only a mixed feeling of bruising and discomfort lingers as witness to the violence of the spent nerve storm.

In the more severe forms, at their zenith the pain may overflow, as it were, into other nerve tracks, the small sciatic and other branches of the sacral plexus, occasionally even invading those of the healthy side. In such cases the pain irradiates into the groin, perineum, and genital sphere, and its severity in the penis has suggested the possibility of a vesical calculus.

Site of Pain.—Albeit, swiftly as the pain comes and goes, the subject can usually with his finger indicate its track. It may run along the back of the thigh from the gluteal fold to the popliteal space, the patient, as Lortat-Jacob graphically describes it, by the gesture of " striking a match on the thigh " denoting its pathway.

More frequently, however, it is to the *branches and area of distribution of the sciatic* rather than to its main trunk that the pain is referred.

The presumed *spontaneity* of the pain in sciatic neuralgia has been regarded by some as one of the most reliable features differentiating it from sciatic neuritis.

Too much stress, we believe, has been laid upon this assumed peculiarity, the spontaneousness being, at any rate in many instances, more apparent than real.

That the patients themselves believe it to arise *de novo* is quite intelligible, but it is significant that on inquiry the accomplishment of certain physiological acts, such as coughing, sneezing, or defæcation, will often be found to have immediately preceded the paroxysm.

Nor can the influence of psychic disturbances be wholly excluded as exciting factors, especially in the more highly strung subjects of either sex.

Should the influence of mental changes, either in the direction of exciting or diminishing pain, be very pronounced, then the possibility at least of an hysterical element in the case should not be overlooked.

Thus, Oppenheim has pointed out that, not only in hysterical women, but also in previously healthy men, sciatica may be complicated by a type of *reflex neurosis*. This takes the form of "weakness, tremor, paræsthesiæ, and sensory disturbances of the type of hysterical hemianæsthesia in the whole half of the body of the affected side."

Of aggravating agencies among the most provocative is the influence of damp cold, this being closely followed in efficiency by changes of temperature. The mere exposure of the limb during examination may prove sufficient to evoke a paroxysm so severe as to forbid its continuance.

John Wesley, in his "Principles of Physick" (1762), remarks, "Rheumatical pains are generally most violent as soon as you are warm in bed," and this is certainly true of sciatic neuralgia.

Should this tendency to pain in the night seasons be strikingly obtrusive, the possibility of a *syphilitic* cause must be apprehended.

In the same way, should the paroxysms show any marked periodicity in their occurrence, it should be recalled that the sciatic neuralgia occasionally met with in *malarial* subjects displays this peculiar feature.

Too much stress, however, cannot be laid upon intermittence and periodicity as proof positive of a paludal origin, for they are common to most varieties of neuralgia.

A daily occurrence of multiple paroxysms is not in any sense distinctive, but should they be tertian or quartan in character it would be very suggestive of a malarial basis.

Objective Phenomena.

The nerve trunk in sciatic neuralgia in cases of recent standing exhibits as a rule *no tenderness to pressure*. Only in patients who have been subject to recurrences during possibly many years can the so-called *points douloureux* of Valleix be elicited, and here the question of their neuralgic or neuritic nature may be a very vexed one.

This statement as to the general absence of tenderness of the nerve trunk is subject to reservation if the sciatic neuralgia be *secondary to a gluteal fibrositis*.

In this event the nerve trunk may be exquisitely sensitive to pressure made upon a nodule lying actually within its sheath or in contiguity to it.

The sensitiveness is absent save at the actual site of the nodule, and if the deposits be situated elsewhere along the track of the nerve, similar tenderness and pain radiating to the periphery will be experienced when they are subjected to pressure.

In the section on fibrositis of the lower extremity we dealt with the location and detection of these nodules, which form, as it were, a link between the more purely muscular types of fibrositis and those involving the nerve sheaths.

Motor Phenomena.—During the acme of a paroxysm the muscles of the affected limb may actually quiver, and such is the indescribable torture that even clonic spasms have been known to occur.

As a rule in pure sciatic neuralgia the muscular system is not implicated, *no wasting* takes place, and the electrical reactions remain undisturbed.

The fear, indeed, of inducing a paroxysm of pain may lead to restricted muscular activity, and in this way a sort of pseudoparesis develops, whose degree is purely relative to the intensity of the suffering.

Thus, walking, which in sciatic neuritis is intolerably painful, may, on the other hand, in sciatic neuralgia be quite painless in itself, though it may excite a paroxysm.

Very frequently the patient is able to walk a variable distance without inconvenience, when suddenly he is seized with pain, lameness, or cramp, and brought up sharp by the piercing, shooting pangs which announce the onset of the attack.

In the intervals of the paroxysms the muscles and integuments commonly allow of the strongest pressure without discomfort, and it is noteworthy that prolonged compression of them by the edge of a chair is not so invariably provocative of an attack of pain as in the graver condition of sciatic neuritis.

Abnormalities in Gait.—As a rule the subject of sciatic neuralgia shows no peculiarity in gait, but in severe cases, through apprehensiveness, he carries his body stiffly, with a list forwards and to one or other side. These postural adaptations, scoliosis, etc., are, however, more marked in sciatic neuritis, and we shall defer their more detailed consideration to a later section.

Sensory and Trophic Changes.—In unquestioned examples of the affection objective phenomena of this description do not appear.

Only in cases of long standing and after repeated recurrences are there any evidences of their presence, and when such occur the case should be relegated to the category of neuritis, and we shall refer to them in the coming section.

Course and Remote General Effects.

In inveterate examples, usually met with in the middle-aged, grave deterioration of the general health sometimes ensues as the disorder tends to become permanent, gathering intensity with advancing years.

The appetite fails, and the digestive troubles that follow in its wake lead to impairment of general nutrition. Nor is this all, for, especially in those of neuropathic type, profound mental depression sometimes grips the harassed victim, who in rare instances develops suicidal tendencies.

> " Sweet recreation barred, what doth ensue
> But moody and dull melancholy,
> Kinsman to grim and comfortless despair ?"

But the course and character of the disease display many variations. In some after one severe attack the disorder may vanish, to reappear no more, but such is unusual and more characteristic of sciatic *neuritis.* Unfortunately this, like other forms of neuralgia, tends to become chronic, though with frequent intervals of exemption of varying duration.

In view of this marked tendency to relapses a too sanguine prognosis is unwise. Especially gloomy is the outlook if the onset ensues after middle life, and the subject shows signs indicative of arterial degeneration and premature senility.

On the other hand, we may be more hopeful in the presence of comparative youth, particularly if there be no history of hereditary neuroses, and if its onset can with any certainty be referred to some transient circumstance, such as unusual strain, exposure, or some functional derangement.

Where the neuralgia is secondary to infective processes or due to pressure, the prognosis will, of course, depend on how far the causal morbid process can be mitigated or removed, and the same reservations must be held in regard to the outlook in cases of gouty or so-called " rheumatic " origin.

Sciatic Neuritis.

Clinical Account.

Mode of Onset.—Unlike sciatic neuralgia, whose onset has all the abruptness of an assault, that of sciatic neuritis is commonly insidious and gradual. This is true of the vast majority of cases.

whether of *primary* or *secondary* nature; but in isolated instances of the former the onset may be quite abrupt, with considerable pyrexia and constitutional disturbance.

In our experience, however, the condition most commonly supervenes *secondarily to a lumbo-sacral or gluteal fibrositis*, and this, we suggest, explains the tardiness with which it usually becomes established. So it is that irksome feelings of aching and stiffness diffused over the gluteal or sacral regions may linger on for days or even weeks, and slowly and imperceptibly they give way to that unmistakable benumbing ache which betokens the extension of the morbid process to the actual sheath of the nerve.

Again, when *secondary to intrapelvic disease*, save in the case of the more rapidly growing neoplasms, the onset will be similarly insidious, pending the increase of pressure or invasion of the nerve sheath.

Subjective Symptoms.

Initial Site of Pain.—This will vary largely in accordance with the exact etiology of the particular example under consideration. In *primary* instances, in which from the very onset the sciatic sheath itself has been implicated, the pain will from the first be strictly localized to the trunk as it courses down the thigh.

In rarer instances of this nature the initial twinge may be felt in the peroneal or malleolar regions.

If, as commonly is the case, it be *secondary to gluteal fibrositis*, the subjects—when asked as to the site of the pain—do not in the earlier stages refer it with any degree of precision to the point of emergence or course of the affected nerve.

Drawing the *palm* of their hand over the buttock and back of the thigh, they complain of a vague uneasiness or a dragging sensation in these regions, for, as before stated, in this initial period the morbid process is located in the fascial or aponeurotic coverings of these areas.

Ultimately, however, it extends to the nerve sheath, and concomitantly the pain, therefore, tends to localize itself more and more exactly along the line of the involved nerve, and now, if asked, the patient will with his *finger-tip* accurately map out its course.

Lastly, in those by no means infrequent cases preceded by lumbago—the initial sciatic pain is experienced directly over the sacral region of one or other side, and in a few hours or days shoots down the back of the thigh.

But whatever be the original site or mode of evolution, the pain when once established is strictly localized to the nerve trunk or one of its branches.

Path of Pain.—In the more severe types it darts down from the sciatic foramen or from near the posterior iliac spine, not only along the trunk and its branches, but occasionally throughout their area of distribution. But it often displays a tendency to pick out and restrict itself—often with striking exactness—to the course of one or other of its branches.

Thus, the peroneal nerve is especially liable to be the sole site of pain, or it may single out the posterior tibial or confine itself to the *small sciatic* nerve.

In the latter case the localization will indicate that the morbid process has extended up the nerve above the sciatic notch to the point of origin of the small sciatic branch from the sacral plexus.

Lastly, in very rare instances the pain may be located strictly in the *plantar* nerves, where it may be severe, or it may fasten upon the internal twig of the anterior tibial supplying the great toe, when it is very likely to be confused with gout.

Character of Pain.—This in sciatic neuritis, if one may say so, is of a crescendo type. At first tolerable, with passing days it deepens, to culminate sometimes in the fiercest agony that a human being can be called upon to endure. Usually a dull, heavy, abiding ache, it exhausts by its sheer persistence rather than by its violence, and, though it varies in intensity, never wholly dies away.

It is this constancy of the pain that contrasts so strikingly with that of sciatic neuralgia, whose gusts of severity are followed by periods of complete repose.

One peculiarity we would especially emphasize as characteristic of sciatic neuritis is the remarkable *slowness* with which the painful sensations, often benumbing in character, creep from point to point of the nerve or branch affected.

Only occasionally does the pain take on a neuralgic character, becoming acute, lancinating, or burning in nature, and during such exacerbations we have seen vigorous men reduced to a state bordering on frenzy.

Aggravating Factors.—The pain is invariably intensified by the performance of certain movements, or during the assumption of particular postures, which lead to extension or compression of the sensitive nerve.

During absolute rest, indeed, the patient—though always conscious of uneasiness—is relatively comfortable, but only until he attempts to walk. If, moreover, unwise enough to persist in exercise, this comparative freedom during quiescence is withdrawn, and the exacerbations of pain, hitherto only evoked by motion, now begin to rise *spontaneously*.

Of other exciting agencies cold and damp rank high, and more infallibly than in the neuralgic type do coughing, sneezing, and defæcation intensify the suffering.

So much for the description of the site, course, and character of the pain, and now to follow out the evolution of the symptoms, which unfold in that serial and leisurely fashion so typical of sciatic neuritis.

Course of Disease.

The discrepancy that obtains between the abrupt début typical of sciatic neuralgia and the gradual onset of sciatic neuritis extends also to the course of the two affections.

Thus the fitful, episodic, and broken career of the former contrasts sharply with the steady, serial, and uninterrupted evolution distinctive of the latter. The suffering, as we have seen, is constant, and with the involvement of its sheath the nerve trunk withal grows increasingly tender to pressure and very sensitive to extension. Eventually its conducting powers becomes impaired, and the pains and paræsthesiæ of its initial stages become replaced by definite plaques of anæsthesia scattered over its area of distribution.

Being a mixed nerve, motor phenomena are superadded, and twitching and cramps occur, followed by variable degrees of paresis or even paralysis. Coincidently an alteration ensues in the deep reflexes, the tendo Achillis jerk becoming sluggish in response or abolished, while as a late phenomenon the affected muscles waste.

Partly through pain and partly through muscular weakness abnormalities in gait ensue, and a so-called "sciatic scoliosis" may develop, while to complete the picture certain vasomotor and trophic phenomena become manifest.

The decline like the rise of the affection is long drawn out, and weeks, months, or even years may elapse before recovery is absolute and complete.

Such in brief are the salient features of well-marked sciatic neuritis, and as will be seen it presents a very different clinical tableau to the periodic and intermittent phenomena distinctive of sciatic neuralgia.

CHAPTER XXIV

TRUNK SCIATICA

Detailed Consideration of Clinical Phenomena.

In the previous chapter we outlined the clinical pictures presented respectively by sciatic neuralgia and sciatic neuritis, and we shall now pass on to consider the objective changes that ensue in the nerve, and the secondary features that develop in consequence thereof.

The initial and most prominent objective change is *tenderness of the nerve trunk.* This hyperæsthesia may extend throughout the whole or part of its course, but it is usually more prominent at certain spots.

These sensitive areas, or *points douloureux*, are sometimes to be met with in sciatic neuralgia, but only after repeated attacks. As opposed to this, some of them are always to be elicited in genuine sciatic neuritis, and here at any rate the sensitiveness to pressure is clearly due to an actual inflammation in the fibrous sheath of the sciatic trunk.

Location and Detection of So-called "Tender Points."

Their presence is more easily established over those regions where *spontaneous* pain is experienced.

In exploring the nerve for these tender spots, it is neither necessary nor advisable that extreme energy should be displayed, for such ill-advised zeal may to the patient's annoyance initiate an undesirable exacerbation.

We shall now proceed to enumerate their sites, at the same time adding that they are very variable in their incidence, some being present in one case, others in another.

In the region of the hip and thigh the following are the more stable and constant of Valleix's points:

1. The sacro-iliac point, near posterior iliac spine, above the hip-joint.
2. The iliac point, just below the mid-point of the iliac crest, where the superior gluteal nerve ends.

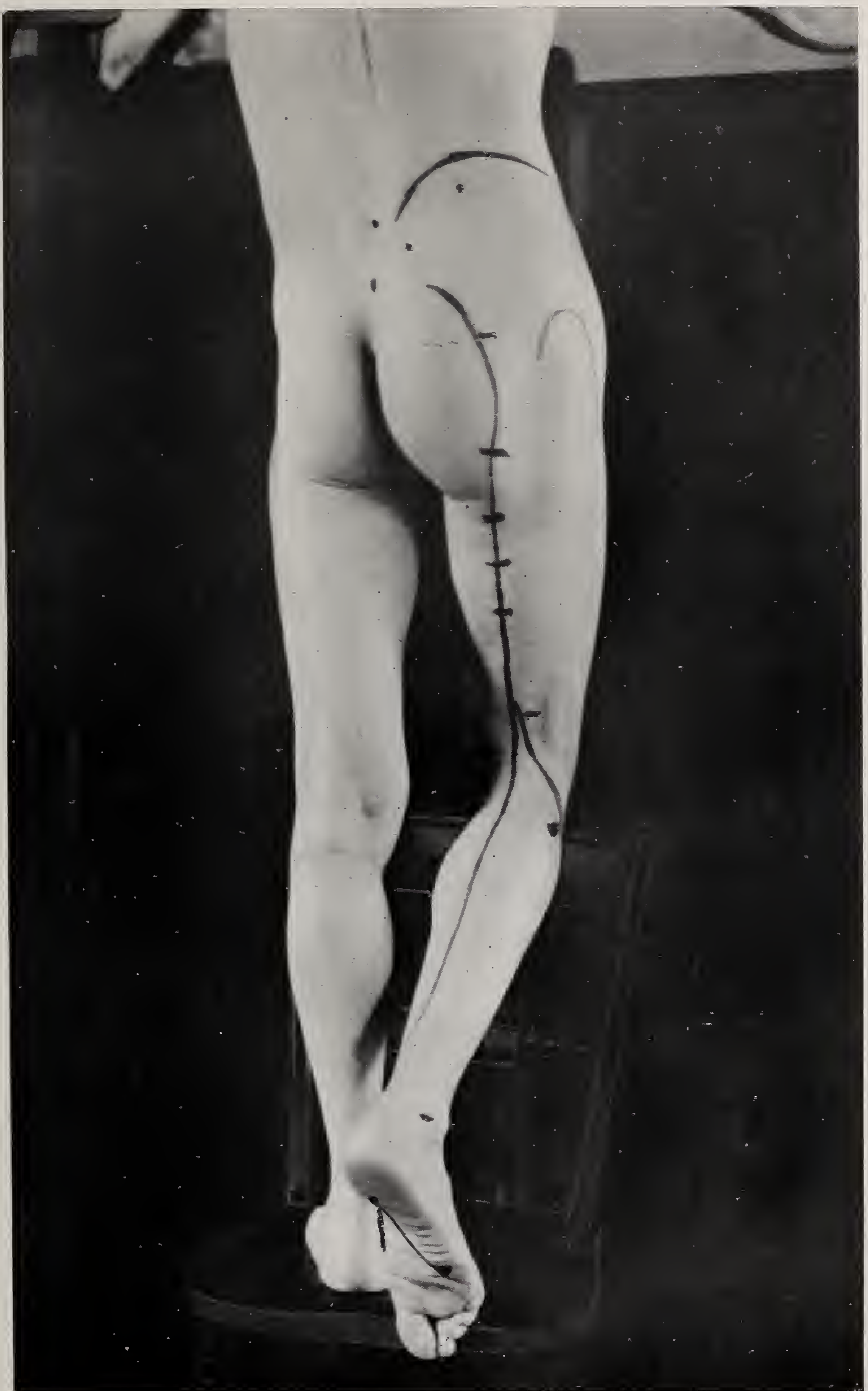


FIG. 59.—Location of the "tender points" found in sciatica.

To face page 320.

3. The gluteal point, over the sciatic notch.

4. The trochanteric point, midway between the ischial tuberosity and the trochanter.

5. One at the inferior border of the gluteus maximus, a site at which *fibrous nodules* are not infrequently found.

The most reliable of the foregoing are the *gluteal* and *trochanteric* points.

The *points douloureux* in the leg and foot are—

6. The mid-point of the popliteal space, where the external popliteal branch of the sciatic trunk is given off.

7. The peroneo-tibial point, located on the neck of the fibula, round which the external popliteal branch winds.

8. The malleolar point, where the external saphenous or sural nerve passes behind the external malleolus.

9. The calcaneal point, situated on the heel.

Of those situated in the leg, certainly the peroneo-tibial is far and away the most constant and reliable, and, being very favourably situated for the action of compression from without, its sensitiveness soon forces itself upon the attention of the sufferer.

Sensitiveness of the Nerve to Extension.

Diagnostic Manœuvres.

A variety of tests are available for the purpose of demonstrating this phenomenon, and in view of the Workmen's Compensation Act they are highly important, if only by reason of their value in unmasking malingerers.

Gowers' Test.—This procedure requires that the patient be seated in a chair, with the knee at a little more than a right angle, and the trunk bent forward so as to place the nerve on the stretch.

If subsequently the finger be pressed into the popliteal space, thereby rendering the nerve more tense, a sharp pain is felt along its course at the back of the thigh.

Gowers holds that it is of diagnostic value in the early stages, and even in instances where tenderness of the nerve at the back of the thigh is absent the sensitiveness of the trunk to extension may reveal the presence of neuritis of the nerve high up within the pelvis. This test, however, in our experience, is by no means infallible.

Lasègue's Sciatic Phenomenon.—To elicit this sign the patient must lie upon his back, his pelvis being firmly held against the bed by an attendant. The physician, with his hand under the sole, gently raises the affected limb, taking especial care, however, that the knee is kept in full extension, and this throughout the manœuvre. Should this precaution be neglected, the method will prove absolutely futile. If done correctly, it is usually followed by pain along the posterior surface of the thigh or in the gluteal region.

The more acute the case, the sooner does the pain ensue. It may occur when the limb has only been raised 12 or 18 inches, but in many instances is not forthcoming until the limb makes an angle of 90 to 100 degrees with the pelvis.

That the pain induced is due to the extension of the sciatic trunk is shown by the fact that flexion of the leg on the thigh leads to its disappearance.

Other plans for ascertaining this tenderness to extension will readily occur to those who are in the habit of seeing many cases of sciatica.

Trunk Flexion Method.—The patient, as before, lies flat on his back, and the physician, planting his hands firmly on the knees of the subject so as to insure their being kept at full extension, then bids him rise to a sitting position.

In very acute cases the mere girding himself together in anticipation of the intended movement is sufficient to evoke suffering, and in any but the slightest cases renders abortive all efforts to arise.

Even when the patient is sitting, another method easily compassed is to fully extend the leg at the knee, when pain will be elicited at the back of the thigh.

In some instances, too, a similar pang may be induced simultaneously in the opposite and unaffected limb.

In reference to these extension tests, it is perhaps worthy of note that in cases where the *peroneal* nerve is alone affected the pain elicited will be strictly confined to the affected portion of the limb.

Another important fact of diagnostic significance is that in certain pressure *sciaticas of intrapelvic origin* these methods of extension may not only not aggravate, but sometimes actually ease, pain. When such is the case, it may be held to indicate that the morbid process is in all probability to be sought for outside the nerve and its sheath.

Contra-Lateral Sign. — This modification of Feuerstein's method is performed in the following manner: The patient lies flat on the bed, with no pillow beneath his head, while his pelvis is immovably fixed by an attendant. The sound limb is then flexed on the pelvis, and afterwards the leg is extended on the thigh. As a result of this a painful feeling is experienced in the gluteal region of the affected limb. This in our hands has proved a very efficient test of sensitiveness.

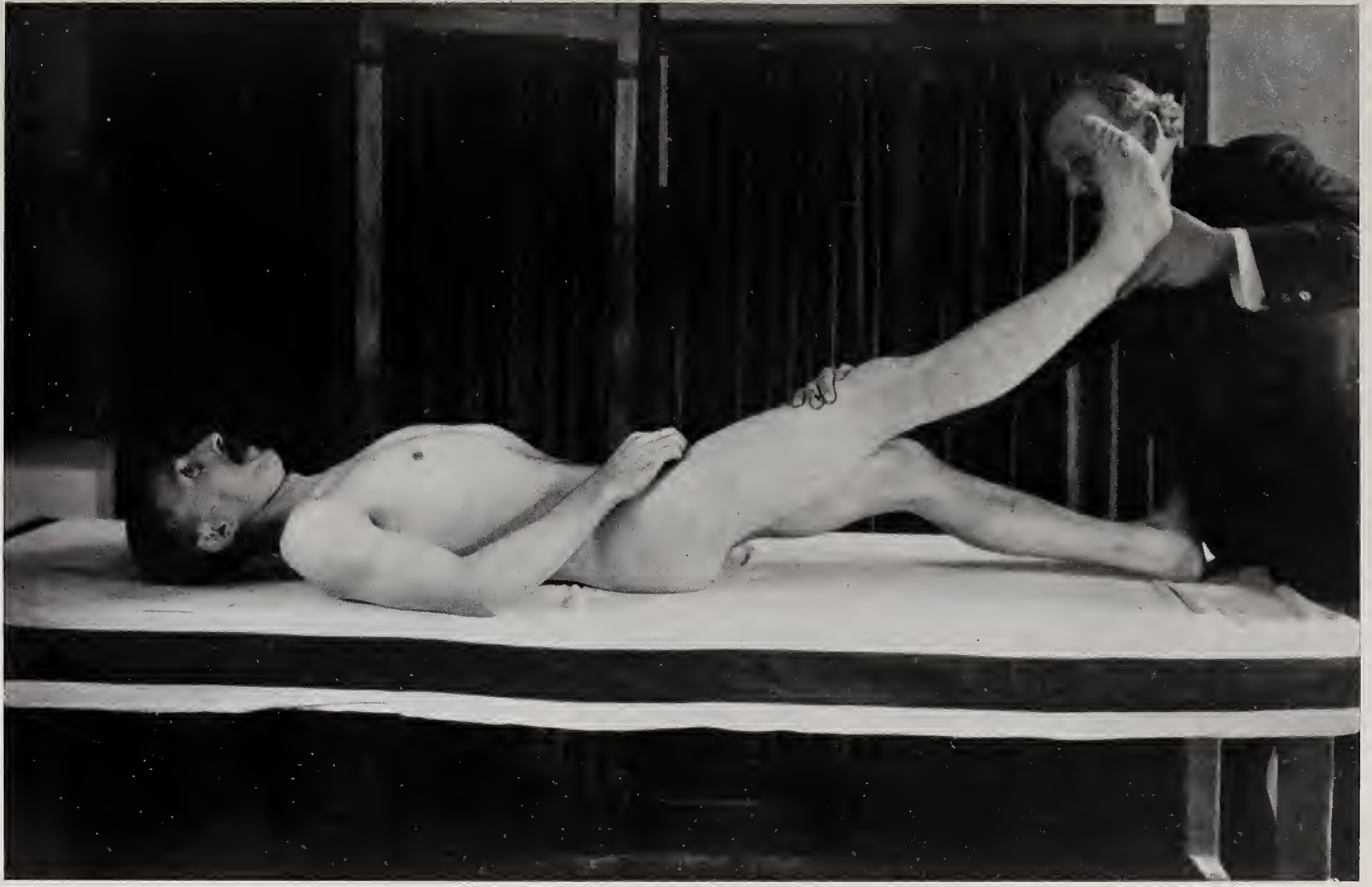


FIG. 60.—Method of eliciting Lasègue's sciatic phenomenon.

To face page 322.

Bonnet's Sign.—According to this observer, by adduction of the healthy limb pain will be excited in buttock of the opposite and affected one.

Erben's Sign.—This authority states that on adduction of the diseased limb pains appear at the point of exit of the sciatic nerve from the pelvis.

We have employed these two methods of adduction, and have not been able to satisfy ourselves as to their utility.

Sensitiveness of the Psoas Muscle to Pressure or Extension.

The presence of *tenderness to pressure* is best elicited by Gara's method: "The patient reclining on his back, one finger-tip of the physician is placed in the median line a finger's breadth below the umbilicus, while another finger-tip is placed two fingers' breadth external to this at the same level. The engaged fingers are then pressed directly backwards towards the vertebral column, when immediately acute pain is complained of."

The pressure necessary to evoke the pain is but moderate, and in our experience, as a rule, no *spontaneous* pain is complained of at this site. Moreover, it cannot be evoked when pressure is applied in the same way over the corresponding region on the opposite side.

Sensitiveness to extension has been the object of special study by Plate of Hamburg, who employs the following manœuvres for its detection:

1. The psoas should be stretched by one hand pressing on the small trochanter, while the other is pressed deeply in between the vertebral column and the posterior superior iliac spine.
2. Or by endeavouring to extend the hip while the patient is lying flat on his abdomen, this being followed by pain along the course of the psoas muscle.
3. Or by placing the patient flat on his back, while the physician, laying his hands on each thigh near the knee, requests the subject to flex his thighs against the resistance he is applying. If this be done, it will be found that on the affected side the flexion of the hip is markedly feebler.

In this author's opinion the underlying condition responsible for the foregoing phenomena is one of *myalgia of the psoas muscle ;* in other words, it is due to a neuralgia of its sensory nerves.

The psoas derives its nerve-supply from the branches of the lumbar plexus, and Plate is of opinion that in sciatic neuritis it frequently happens that the inflammatory process travels up and involves these nerves, which pierce the substance of the psoas.

If this view be accepted, it is easy to understand why the patient instinctively shirks any movement which involves passive extension or vigorous contraction of this muscle. With the object, therefore, of diminishing or obviating pain, the muscle is kept fixed and slightly contracted, with the result that the hip on the affected side is held in a position of moderate flexion.

Lastly, the existence of *intrapelvic tenderness* may be established by rectal or vaginal examination, but too much stress cannot be laid upon its diagnostic value, as tenderness of the sciatic nerve at this site readily admits of confusion with sacro-iliac disease and other intrapelvic disorders.

Location of Fibrous Nodules.

As before stated, many cases of sciatica are secondary to a gluteal, lumbar, or sacral fibrositis, and the morbid process frequently gives rise to diffuse or localized infiltration in these structures.

Site.—These may be single or multiple, and develop either in the subcutaneous cellular tissues, the fascia lata, and the sheaths of the gluteal and other muscles, or in the actual coverings of the nerve itself.

Relatively speaking, they are not commonly to be detected in the gluteus maximus or minimus, their favourite site, as Norstrom long since pointed out, being *the sheath or interstitial tissues of the gluteus medius near its superior insertion.*

We have also met with them near the popliteal space, lying in the tendinous expansions of the hamstrings, or in the fascia at the back of the thigh, or in the outer side of the knee.

The peroneal muscles may also be the seat of extensive infiltrations or circumscribed deposits, and these may give rise to pain along the external popliteal.

For further details of their location we would refer the reader to the previous section on fibrositis of the lower extremity.

Such fibrous formations may definitely precede the appearance of sciatic pain, and in that case the symptoms of muscular fibrositis will anticipate those of definite sciatica.

Frequently, however, they arise as part of a general fibrositis in which the aponeurotic and muscular fibrous tissues of the buttock as well as the nerve sheath participate—all the interstitial tissues reacting to some common pathogenic cause.

According to their site and mode of evolution, they may, through the pressure they exert, give rise to sciatic neuralgia or neuritis by extension of the morbid change. Thus, if situated in the gluteal muscles neuralgia alone may result, the nerve in this case being devoid of tenderness, save at the actual site of a nodule, which, if pressed upon, is exquisitely sensitive, the pain radiating to the periphery.

When situated actually within the nerve sheath, partly as a result of compression and partly owing to extension, a neuritis is initiated, the nerve in this case becoming as usual extremely tender.

Once thoroughly organized, these infiltrations prove obstinately enduring, and their presence is responsible for any relapses. For under the influence of pressure or irritation from endogenous toxins they from time to time undergo swelling, this determining a fresh attack of sciatic pain, for in this power of determining recurrences lies their importance, one, we think, which has been considerably under-estimated.

It is imperative, therefore, that in all cases the presence or absence of such deposits should be carefully determined, not only because of their intimate bearing on the course of the disease but also because of the special methods that must be adopted for their removal.

Postural Adaptations and Alterations in Gait.

In view of the marked exacerbations of pain that follow walking, stooping, or sitting, the unhappy victim adopts various ruses or manœuvres to avoid any extension or compression of the irritable nerve.

To this end, when erect, he stands with the affected limb abducted, flexed at hip and knee, while he is careful that his foot shall only lightly press the ground. In slight cases his style of walk may not be appreciably altered, save to the extent of a slight limp; but in the more severe forms a certain stiffness of carriage develops, the subject instinctively inclining his trunk forward, with the leg flexed upon the thigh to avoid extension of the nerve.

There is, indeed, something reminiscent of vertebral caries in his cautious, groping mode of progression, with an absence of that normal, unconscious swaying of the trunk for balance.

In many instances there is a definite list of the body to one or other side—a secondary *sciatic scoliosis*, to the different varieties of which we shall devote a separate chapter. To resume, in the more severe cases the patient is reduced to hopping along with the tip of the foot of the affected side hardly touching the ground. Later, when to the effects of pain are superadded those of definite muscular paresis, the affected leg is dragged behind, something after the fashion one sees in hemiplegia.

When, as sometimes happens, the brunt of the mischief has fallen on the external popliteal branch, a characteristic " steppage " gait ensues, through palsy of the extensors of the foot.

Ultimately, either through sheer intensity of pain or as a result of muscular weakness, the leg wholly gives out, is kept permanently bent, and the subject flies to sticks or crutches, now indeed indispensable for walking. Frequently, however, the extremity of the distress forbids any attempt at exertion, and the subject is chained either to his couch or bed.

Pose when Recumbent.—The same abduction and flexion of the affected hip is instinctively assumed, with the knee at the same time slightly bent, and he lies over towards the sound side.

Furthermore, the manner in which the victim of sciatica raises himself from the bed or floor is peculiar.

Minor, who has devoted much attention to this point, states that, when endeavouring to rise, the subject invariably plants his hands on the bed or floor *behind* him. He then gradually shifts his pelvis backwards, while at the same time he bends his knees, drawing the soles of his feet beneath his buttocks. Subsequently, turning on to his sound side, he raises himself on the corresponding arm and leg, maintaining his balance with the other arm held in the air.

Minor contrasts this with what occurs under similar circumstances in lumbago, in which disorder, much after the fashion of the sufferer from progressive muscular dystrophy, the subject places his hands on the ground in *front* of him, resting his weight upon them, then works his hands up his legs, finding support for them at successively higher levels until he stands upright.

Mode of Sitting.—When wishful to sit, he selects by preference a chair provided with arms, by which he sustains the weight of his body. He then stoops gingerly to rest on the ischial tuberosity of the *unaffected* side, the other buttock being guarded as far as possible from any contact.

In very acute cases the greatest care is taken to bring the trunk and thigh as near as possible in a straight line with each other. To achieve his purpose, the sufferer sits at the extreme edge, with his trunk strongly inclined backwards, and in this way avoids compression or extension of the nerve.

If desirous to rise, he leans well forward, at the same time withdrawing his feet backwards as far as he can, more especially the affected leg, and then, resting on the arms of the chair, he slowly arrives at a standing position.

If he has to stoop, he endeavours to keep the affected leg

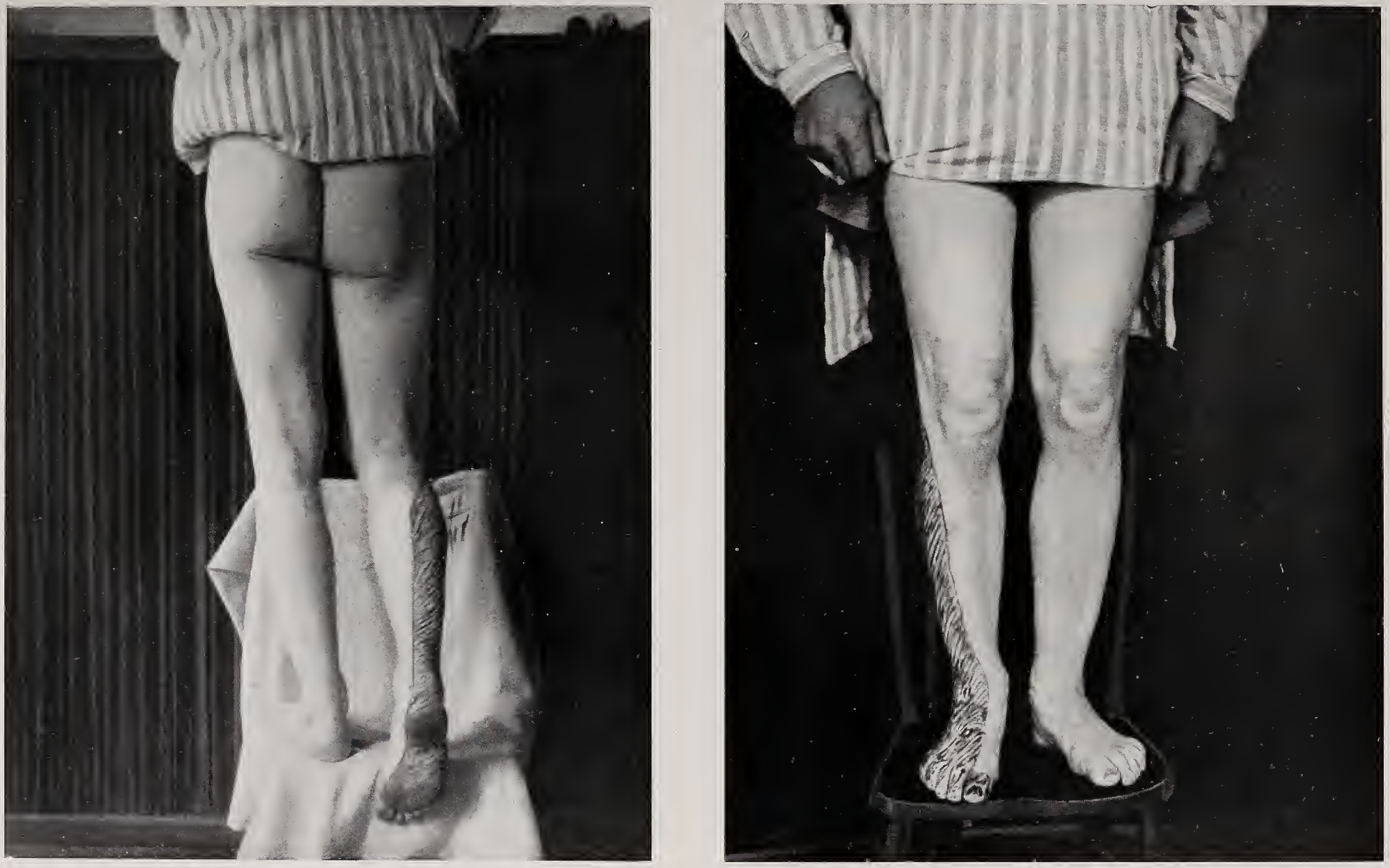


Fig. 61.—Shaded areas indicate region in which anæsthetic patches are found in sciatic neuritis of trunk type.

To face page 326.

extended, thrusting it back as far as he can behind him, so as to insure all the flexion movement devolving upon the sound limb.

All these various manœuvres and poses are but ruses to avoid pressure or dragging upon the sciatic trunk; but, as we have seen, in the severer cases to the effects of pain are added those due to muscular paresis or palsy, whence the "steppage" gait before alluded to.

Sensory Disorders.

In addition to the manifestation—pain—we have to consider various sensory perversions and the terminal phenomena of actual objective sensory loss.

Parœsthesiœ.—Should the primary perineuritis be followed by an extension of the inflammatory process to the *interstitial* tissues of the nerve, irritation of its conducting fibres will ensue.

Under its influence, beyond mere pain, various sensory perversions will be experienced, such being referred to its distal portions and area of distribution.

Among those commonly complained of may be mentioned formication, "pins and needles," and numbness. This latter is often a prominent and comparatively early symptom, which frequently gives place later to a sensation of the limb being swollen or of increased bulk, and sometimes patients complain that it feels as if it might burst.

Anœsthesia.—The evidence of impaired sensation, when present, will be found on the peroneal aspect of the leg, the outer side of the dorsum of the foot, as well as the sole. The sensory alterations amount as a rule to a diminished appreciation of light touches.

At the same time there is a lowered sensitiveness to fine differences of temperature, also of cutaneous localization and discrimination of the points of the compass.

In the more severe cases complete anæsthesia may be observed, the distribution of which is usually *patchy and circumscribed.*

In the ordinary type of *trunk neuritis* the sensory alterations will be restricted to *the leg and foot.*

They will be found on the outer half of the anterior surface of the leg, beginning at the level of the kneecap, and on the foot anywhere save on its internal border and that of the great toe.

But in instances where the morbid process has extended up the trunk to a point above the small sciatic, or where this has been involved in a simultaneous neuritis, there will be found discrete areas of anæsthesia over *the back of the thigh.*

Obviously, cases presenting areas of anæsthesia in the upper segment of the limb or thigh cannot be legitimately regarded as pure cases of trunk sciatic neuritis, inasmuch as the sensory territory of the great sciatic is strictly delimited, as before stated, to the lower or leg segment.

When, therefore, sensory changes are found *outside* the true distribution of the great sciatic, the question arises as to whether we are not dealing with *root* as opposed to *trunk* neuritis.

Speaking of the sensory disorders met with in neuritis of the sciatic trunk, Lortat-Jacob states that they consist indifferently of anæsthesia, hypo-æsthesia, and hyperæsthesia.

As a rule, he says, sensibility is impaired in all its forms, but occasionally dissociation is observed—viz., the sense of temperature is retained, while that of touch and pain may be lost. This observer specially insists that the presence of sensory changes in the thigh is diagnostic of *radicular* as opposed to trunk neuritis of the sciatic nerve.

Motor Phenomena.

Fibrillary tremors are occasionally noted in the related muscles, and painful cramps are common features in severe cases.

Muscular Weakness.—Apart from the inhibitory effects of pain, the limb is weak, and in advanced stages patients frequently complain that it feels very heavy, and for this reason they cannot move it as readily as before, even when the pain was more severe.

The pseudo-paresis that results from severe pain, and which is frequently met with in pure sciatic neuralgia, must be distinguished from the definite loss of power which ensues in the later stages of neuritis, and which, indeed, often develops after the pain has considerably abated or passed away.

It seems probable that the loss of power comes into prominence, as it were, when the more acute inflammatory changes with their associated pain are subsiding.

Presumably it is the outcome of pressure upon the nerve by products effused into its sheath, and in this way its functional integrity becomes impaired; hence the loss of power. Such paresis in severe cases may extend to muscles not directly innervated by the sciatic, such as the gluteus maximus and the abdominal muscles, this being, of course, due to an extension of the morbid process to the plexus and other nerve tracts.

Muscular Atrophy.—Wasting of the muscles usually only develops very slowly, but in isolated cases it has been noted to

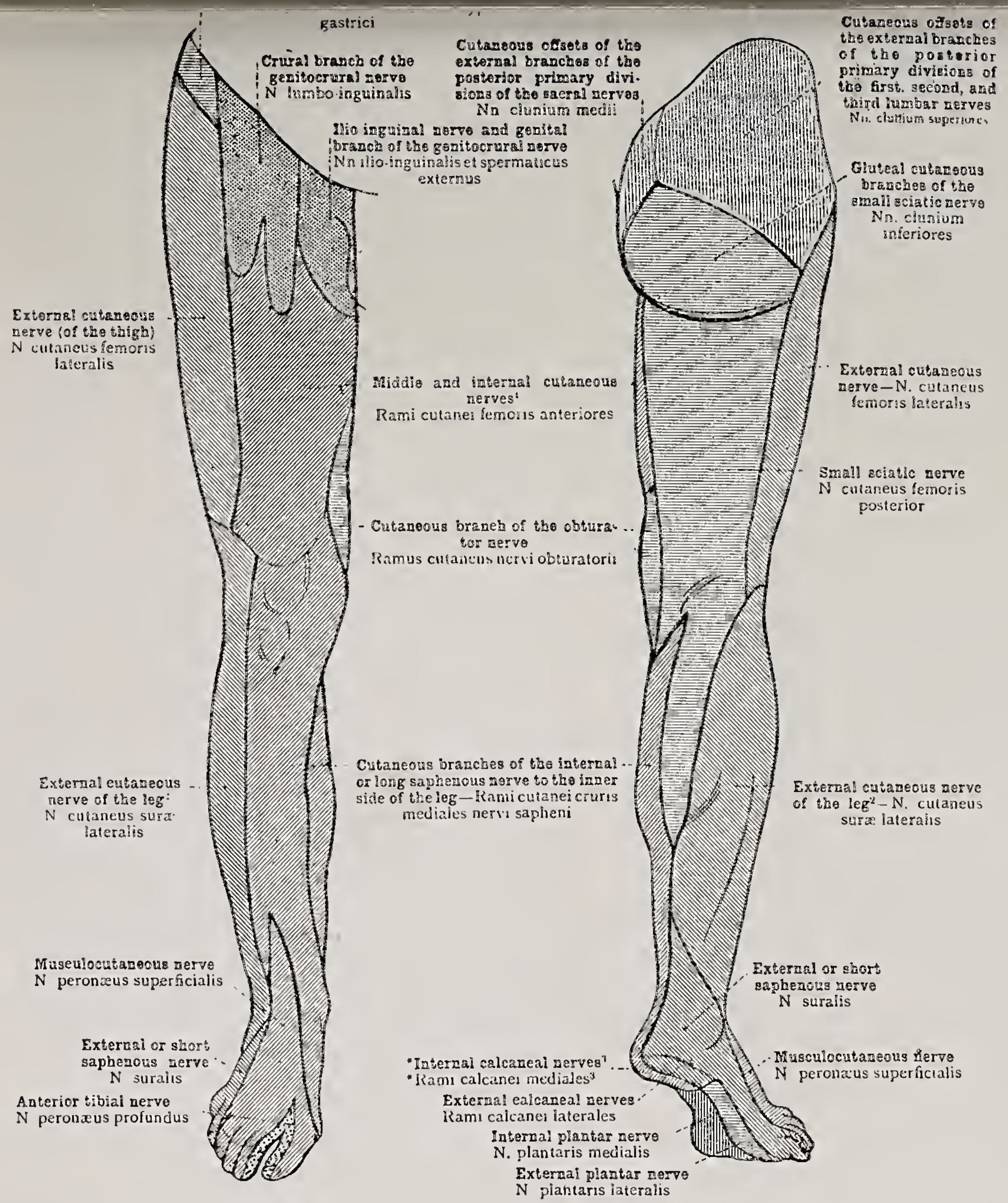

gastrici
Crural branch of the genitocrural nerve
N lumbo-inguinalis
Cutaneous offsets of the external branches of the posterior primary divisions of the sacral nerves
Nn clunium medii
Ilio inguinal nerve and genital branch of the genitocrural nerve
Nn ilio-inguinalis et spermaticus externus
Cutaneous offsets of the external branches of the posterior primary divisions of the first, second, and third lumbar nerves
Nn. clunium superiores
Gluteal cutaneous branches of the small sciatic nerve
Nn. clunium inferiores
External cutaneous nerve (of the thigh)
N cutaneus femoris lateralis
Middle and internal cutaneous nerves¹
Rami cutanei femoris anteriores
External cutaneous nerve—N. cutaneus femoris lateralis
Small sciatic nerve
N cutaneus femoris posterior
Cutaneous branch of the obturator nerve
Ramus cutaneus nervi obturatorii
External cutaneous nerve of the leg²
N cutaneus suræ lateralis
Cutaneous branches of the internal or long saphenous nerve to the inner side of the leg—Rami cutanei cruris mediales nervi sapheni
External cutaneous nerve of the leg²—N. cutaneus suræ lateralis
Musculocutaneous nerve
N peronæus superficialis
External or short saphenous nerve
N suralis
External or short saphenous nerve
N suralis
Anterior tibial nerve
N peronæus profundus
*Internal calcaneal nerves¹
*Rami calcanei mediales³
Musculocutaneous nerve
N peronæus superficialis
External calcaneal nerves
Rami calcanei laterales
Internal plantar nerve
N. plantaris medialis
External plantar nerve
N plantaris lateralis

FIG. 62.—The cutaneous areas of the nerves of the lower extremity, anterior and posterior surfaces. (Toldt's Atlas.)

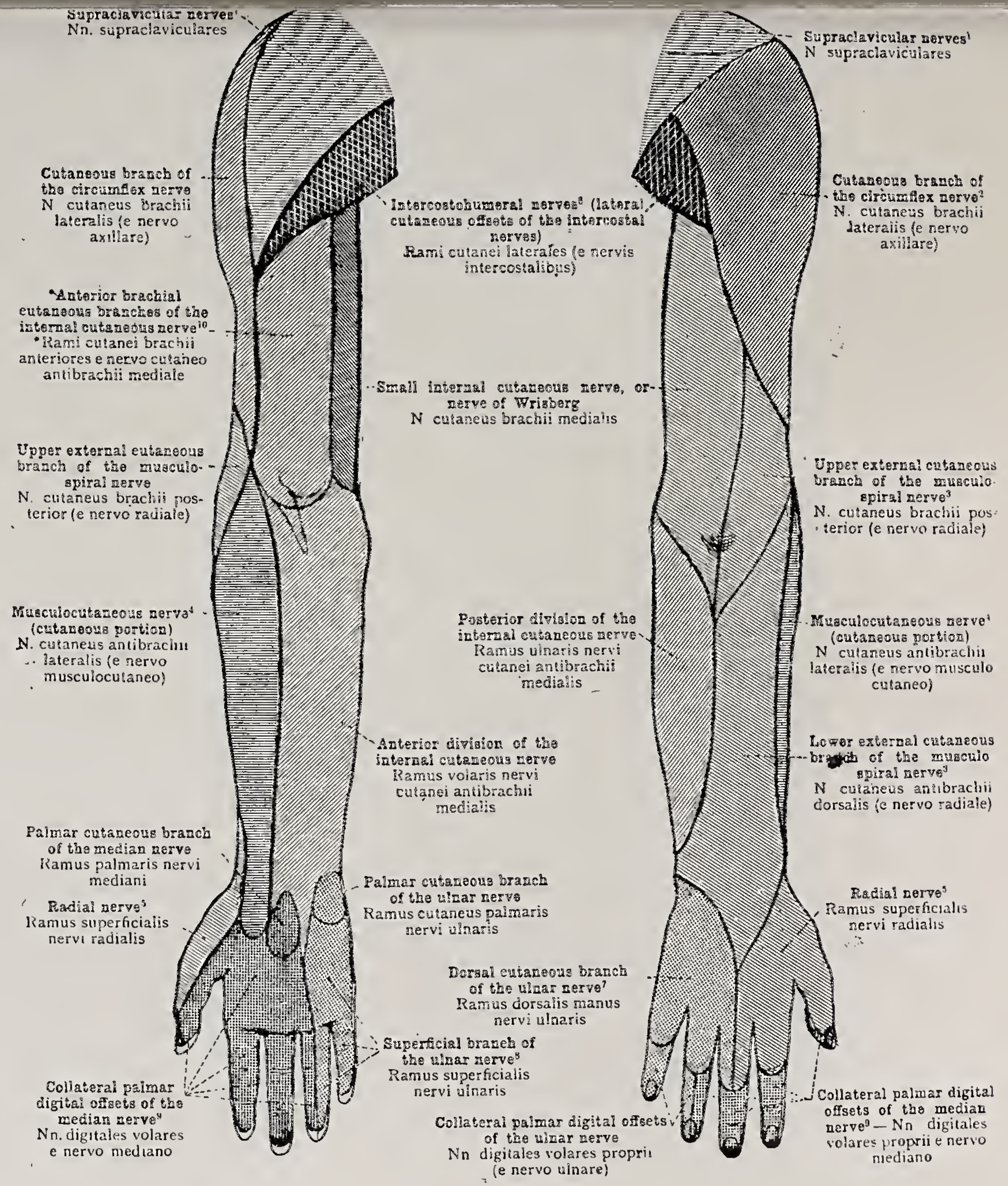

Supraclavicular nerves¹
Nn. supraclaviculares
Supraclavicular nerves¹
N supraclaviculares
Cutaneous branch of the circumflex nerve
N cutaneus brachii lateralis (e nervo axillare)
Intercostohumeral nerves⁸ (lateral cutaneous offsets of the intercostal nerves)
Rami cutanei laterales (e nervis intercostalibus)
Cutaneous branch of the circumflex nerve²
N. cutaneus brachii lateralis (e nervo axillare)
*Anterior brachial cutaneous branches of the internal cutaneous nerve¹⁰
*Rami cutanei brachii anteriores e nervo cutaneo antibrachii mediale
Small internal cutaneous nerve, or nerve of Wrisberg
N cutaneus brachii medialis
Upper external cutaneous branch of the musculo-spiral nerve
N. cutaneus brachii posterior (e nervo radiale)
Upper external cutaneous branch of the musculo-spiral nerve³
N. cutaneus brachii posterior (e nervo radiale)
Musculocutaneous nerve⁴ (cutaneous portion)
N. cutaneus antibrachii lateralis (e nervo musculocutaneo)
Posterior division of the internal cutaneous nerve
Ramus ulnaris nervi cutanei antibrachii medialis
Musculocutaneous nerve¹ (cutaneous portion)
N cutaneus antibrachii lateralis (e nervo musculo cutaneo)
Anterior division of the internal cutaneous nerve
Ramus volaris nervi cutanei antibrachii medialis
Lower external cutaneous branch of the musculo spiral nerve³
N cutaneus antibrachii dorsalis (e nervo radiale)
Palmar cutaneous branch of the median nerve
Ramus palmaris nervi mediani
Radial nerve⁵
Ramus superficialis nervi radialis
Palmar cutaneous branch of the ulnar nerve
Ramus cutaneus palmaris nervi ulnaris
Radial nerve⁵
Ramus superficialis nervi radialis
Dorsal cutaneous branch of the ulnar nerve⁷
Ramus dorsalis manus nervi ulnaris
Superficial branch of the ulnar nerve⁸
Ramus superficialis nervi ulnaris
Collateral palmar digital offsets of the median nerve⁹
Nn. digitales volares e nervo mediano
Collateral palmar digital offsets of the ulnar nerve
Nn digitales volares proprii (e nervo ulnare)
Collateral palmar digital offsets of the median nerve⁹—Nn digitales volares proprii e nervo mediano

FIG. 63.—The cutaneous areas of the brachial nerves of the anterior and posterior surfaces of the upper extremity.

To face page 328.

ensue very rapidly. It is extremely variable in degree, and in many cases is inappreciable.

In long-standing cases a generalized wasting of the whole limb is clearly to be observed, but to detect the slighter degrees the circumference of the leg above and below the knee should be carefully and repeatedly measured at fixed points.

The muscular debility complained of bears no constant relation to the degree of atrophy; indeed, with slight wasting great weakness may be felt, and, *vice versa,* in the presence of marked atrophy the subjects may be unconscious of any motor disability.

Though as a rule the atrophy is *generalized* and slight in degree, yet, as Charcot pointed out, it may be of *partial* distribution and restricted to the muscles supplied by the external popliteal, or more rarely to those innervated by the posterior tibial branch. In severe cases the muscles are not only flabby, but show that *tenderness to touch* associated with neuritis, and that chiefly noticeable in the calves.

Lastly, it may be mentioned that exceptionally it may pass beyond the area of the sciatic trunk and involve the abdominal muscles.

Thus, Ludwig Mann has recorded an instance of bilateral palsy of the abdominal muscles supervening in the course of sciatic neuritis, and attended by a marked degree of lordosis.

Hypotonia.—According to Lortat-Jacob, in very prolonged cases of sciatic neuritis, owing to impairment or loss of tone in the muscles, these may become extremely flaccid, admitting of an abnormal degree of movement at the joints.

In conclusion, it may be said that the muscular weakness and atrophy in sciatic neuritis are not commonly of very high degree, and when of extreme grade they are usually most marked in the muscles supplied by the external popliteal branch.

Alteration in Reflex Reactions.

It is essential that in all cases, whether of sciatic neuralgia or sciatic neuritis, the deep reflexes should be examined. It should be borne in mind, moreover, that in sciatica the important one to investigate is not the patellar reaction, but, on the other hand, the *tendo Achillis or ankle-jerk.*

The centre of the *patellar reflex* lies at a higher level, owing allegiance to the *third and fourth lumbar segments,* whereas the *tendo Achillis reflex* is governed by the *fifth lumbar and first sacral segments.*

It will be seen, therefore, that the latter is the deep reflex most intimately associated with the origin of the sciatic trunk; hence the importance of ascertaining any alteration in its reaction in sciatica.

As a rule, with few exceptions, we have found that, though the knee-jerks on the affected side are exaggerated, the ankle jerk on the same side is frequently weakened, and in well-marked cases of neuritis is abolished.

But cases have been recorded in which the patellar reflex has been diminished, and such modifications would appear to indicate an extension upward involving this centre.

The tendo Achillis reflex, once abolished, may be a long time returning to normal, even after pain has disappeared.

Oppenheim states that he has frequently found the Achilles tendon on the affected side abnormally flaccid and shrunken in size.

As opposed to this, in sciatic neuralgia the Achilles jerks remain normal in reaction.

Finally, the superficial reflexes, cremasteric, plantar, and gluteal, are often exaggerated on the affected side.

Electrical Reactions.

The estimation of any qualitative change of electrical excitability is of great importance, inasmuch as it enables one to detect the presence of neuritis in the early stages. The combination of muscular wasting with a partial reaction of degeneration is a proof that the case is not one of simple neuralgia, but one of neuritis.

Phulpin, who has devoted much attention to this point, found that there was no alteration in the electrical reactions in sciatic neuralgia either of trunk or radicular distribution.

The complete reaction of degeneration has been but very rarely seen in sciatica, and then only in isolated muscles.

Vasomotor and Trophic Phenomena.

With quite a notable frequency, a sensation of coldness on the part of the affected limb annoys the patient, and it is interesting to recall that in "Timon of Athens" we find the disease apostrophized as follows:

> "Thou *cold* Sciatica, cripple our Senators."

Nor is this impression a wholly subjective one, for the limb feels actually colder to the touch than the sound one.

This local diminution of the surface temperature was pointed out in the first instance by Lawson, a writer on the subject, and

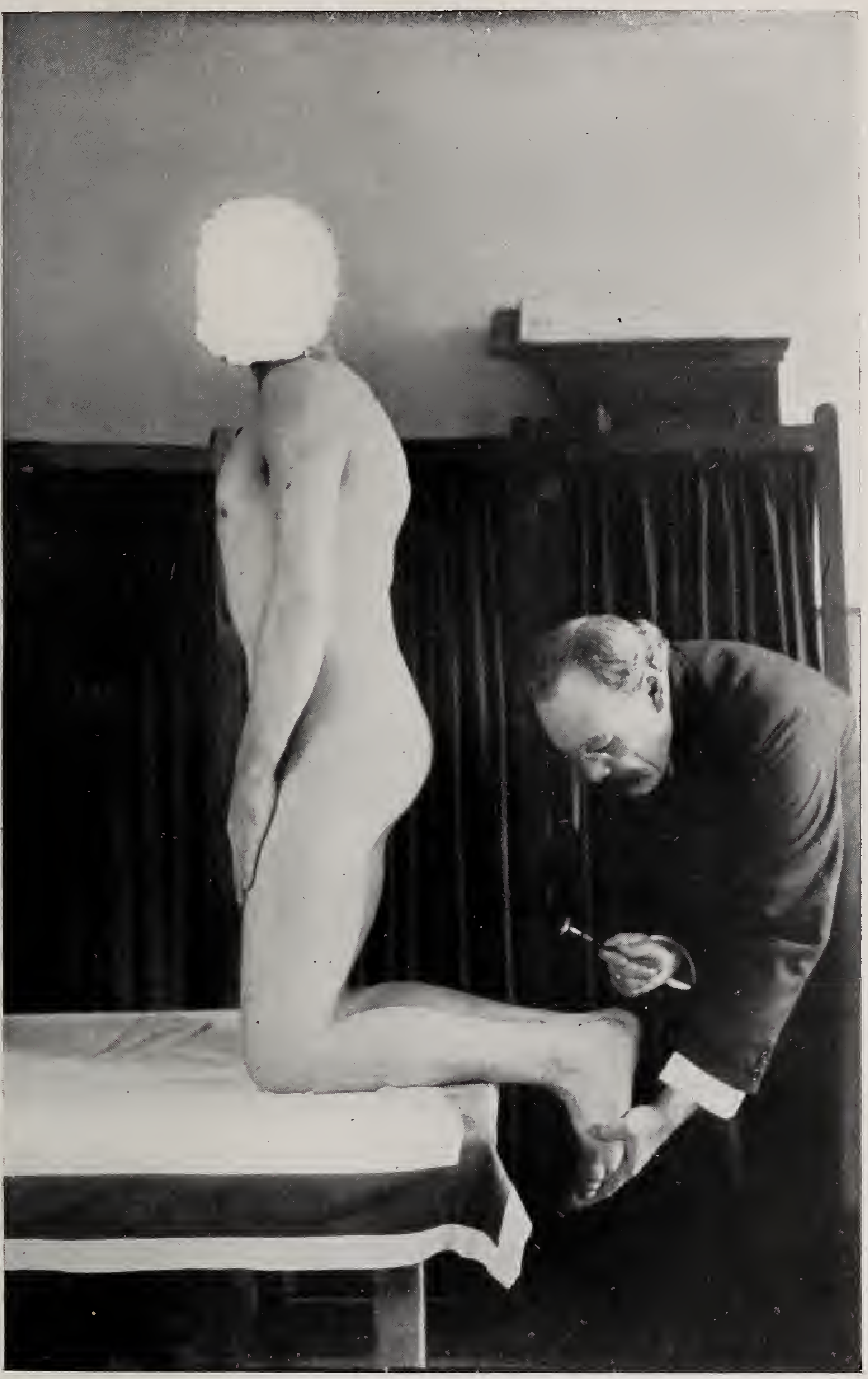


FIG. 64.—Method of eliciting tendo-Achillis jerk.

To face page 330.

himself a sufferer; and Lortat-Jacob and others have since shown that it is thermometrically demonstrable.

There is no constant relationship between the phenomenon and the intensity of the pain, and, indeed, it may be absent, even in the most severe cases.

Occasionally, despite the objective coldness, the patient may complain of a feeling of subjective heat.

Erben, who has devoted much attention to these thermometric disorders, has pointed out that the reverse condition may be present—viz., an actual local rise in surface temperature.

Local chilling, when present, is most easily appreciable over the region of the knee-joint, and the disagreeable sensation may outlast the painful feelings. In some cases it may be absent over the knee, but present over the region of the calf.

In conclusion, this perversion, presumably of vasomotor origin, is in our experience so common a feature of sciatic neuritis that we believe it to be almost of diagnostic importance.

Subcutaneous Adiposity.—This trophic phenomenon is not only of great interest, but of practical importance. It is of the nature of a local obesity, an increase in the subcutaneous fat, which may extend over the whole limb or be confined to the thigh or leg, but is more commonly observed in the former.

The proliferation of the adipose elements in the cellular tissues and skin of the diseased limb may, in our experience, proceed to such an extent as to mask entirely the underlying muscular atrophy, and it may, indeed, result in the diseased limb being larger in circumference than its fellow.

This thickening of the panniculus adiposus can be appreciated by pinching up a fold of skin and comparing it with that of the unaffected limb.

Landouzy, who originally described the condition, believed that, as a result of vasomotor disturbances in sciatica, a state of hypothermia ensued in the limb. This in its turn led to diminished oxidation and impairment "of the territorial vitality," with, as a consequence, lessened consumption of fat, leading to this local obesity.

Aspect of Skin.—Not infrequently the skin of the affected limb presents a bluish or violaceous tint, especially when the subject is standing. Occasionally we have seen irregular blotches of *pigmentation* appear along the course of the nerve trunk. The secretion of sweat may be disturbed, more commonly in the direction of anidrosis; but we have also observed the opposite secretory change, hyperidrosis.

Duplay has recorded an example with perforating ulcer, and an overgrowth of hair is sometimes to be observed.

In addition to being unusually dry, the skin gives the impression at times of having undergone thinning, with lessened suppleness, a result, presumably, of insufficient nutrition.

A tendency to a successive crop of pimples or small boils is sometimes a feature, the malnutrition of the limb favouring *surface infection.*

Erythematous eruptions, sometimes extensive, have also been observed, and we have in rare instances seen a widespread crop of *herpes* complicate sciatica, and in one example the eruption was delimited to the peroneal area.

Duration.

This is extremely variable, and into its determination many factors enter. Of these the most important are the nature and intensity of the underlying morbid process, and the stage of the disease at which treatment was undertaken.

In sciatic neuritis of *rheumatic or gouty* type, if the aggravating circumstances, whether constitutional or environmental, are allowed full scope, then the affection for an indefinite period may resist all efforts for its expulsion.

The asset of comparative youth favours short duration, but premature senility or a neuropathic taint tends to prolongation of the malady.

From the point of view of its amenability to treatment, if the subject in the early stages can be prevailed upon to rest, the malady may be subdued within a few weeks, if this be conjoined with appropriate treatment of the underlying diathetic or toxic state. If such measures can be adopted before the pain has taken on a spontaneous character, and while it is only to be evoked by movement, the attack may not exceed three to six weeks in duration.

But once the pain becomes *spontaneous* in character, it tends to be most obstinate in its continuance, and may harass the patient for a twelvemonth or more.

Indeed, in inveterate cases lasting traces of the affection may be left; the limb may not lose its wasted appearance for years, the patient meanwhile remaining permanently disabled through its weakness.

In our experience we have known cases endure for four or five years, and Fuller cites instances of eleven and thirteen years' duration.

Gowers on this point remarks that, if the pain be *spontaneous*, the affection may last a twelvemonth, while, if it outlast this extended period, partial recovery and relapses are very frequent.

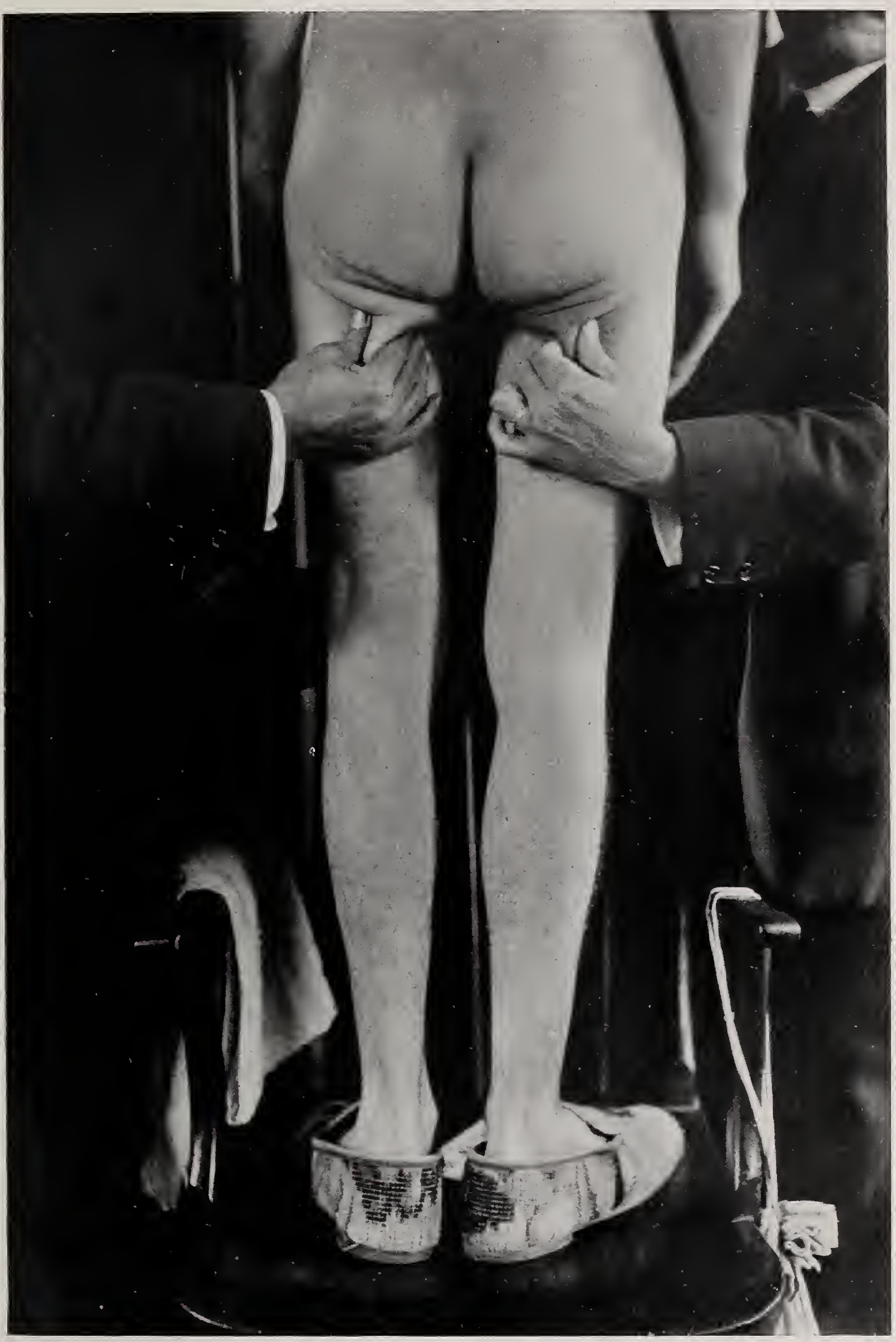


Fig. 65.—Subcutaneous adiposity. Note the larger fold of skin that can be picked up in the left lower limb, which was the seat of sciatic neuritis and muscular wasting.

To face page 332.

The wasting of the muscles may prove extremely obstinate, fibrillary twitchings and cramps also continuing to harass the patient long after the pain has ceased.

In addition, according to Gowers, a *secondary neuralgia* may follow on neuritis, the pains of which may radiate to other nerve tracks.

Taken on the whole, however, the liability to relapses is not nearly so pronounced in sciatic neuritis as in sciatic neuralgia, where it is the rule rather than the exception.

In *secondary sciatic neuritis*, of course, all will depend on the nature of the primary disorder, whether it admits of removal or amelioration. Thus, in cases which have developed out of a gluteal or lumbo-sacral fibrositis, the duration may be indefinitely prolonged if the accompanying and causal nodules or infiltrations have not been satisfactorily dispersed. The same is, of course, true of neuritis secondary to intrapelvic growth—*i.e.*, is it capable of removal or not ?

Complications of Sciatica.

These fall into two classes: those due to direct extension of the morbid process, and those remote secondary effects exerted upon the organism by severe and incessant pain, with its associated lack of rest.

Extension of Morbid Process.—Gowers has drawn attention to the fact that some instances of unilateral sciatic neuritis may at their onset be accompanied by bilateral symptoms, such as pain and tingling in the feet, or paresis of the flexors of both extremities. He would attribute such to the action of an associated poison—alcohol—superimposing its influence upon a gouty taint.

Very rarely an extension upwards to the lumbar plexus ensues, the pain thereupon being reflected down along other nerve trunks.

More commonly, in consequence of an extensive intrapelvic fibrositis, the coverings of several nerves are simultaneously involved, the sciatic only participating in a general neuritis of the crural nerve trunks.

All the foregoing complications are extremely rare, and we must now pass on to consider briefly the remote effects of sciatic neuritis.

Remote Secondary Effects.—Though sciatic pain does not appreciably shorten life, yet, if long continued, it sadly embitters it, and in consequence the general physical tone of the sufferer sinks to a minor key.

In the more inveterate types the persistent pain sometimes induces a genuine condition of neurasthenia; while if of neuropathic stock the victim may become hypochondriacal, and, lacking fortitude, has been known to seek self-destruction.

Lortat-Jacob on this point alludes to two instances recorded by Billroth and Azam in whom *epileptic attacks* supervened.

In the former the sciatic pain was the outcome of trauma, the patient falling from a ladder backwards on to the corner of a table while holding a weight of 30 kilos in his arms. Swelling of the region between the sacrum and ischium followed, and in swift sequence symptoms of sciatic neuritis complicated by epileptic attacks.

In Azam's case, epileptiform seizures supervened after resection of some 3 centimetres of the nerve in the lower third of its course in the thigh.

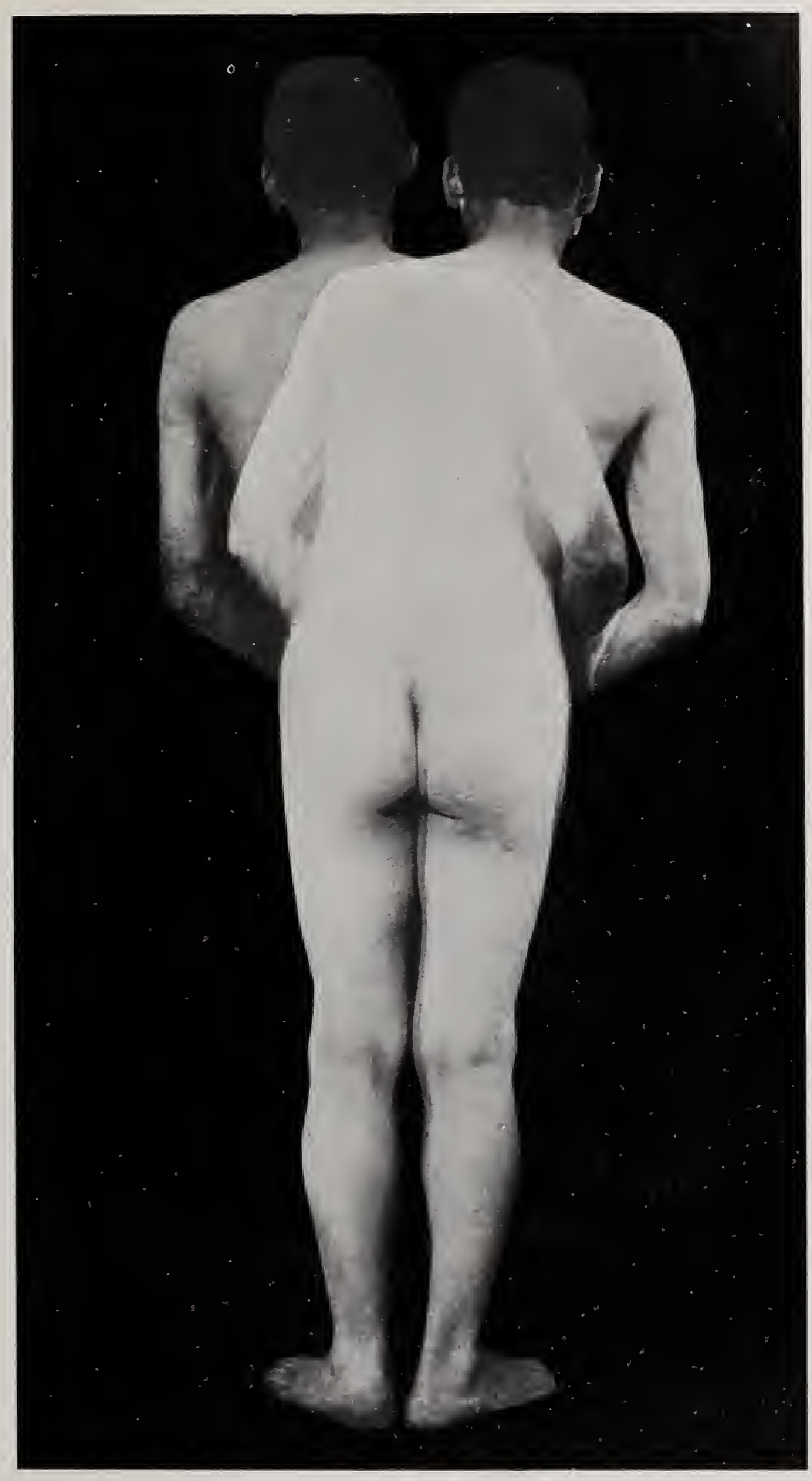


Fig. 66.—Scoliose alternante avec lombo-sciatique droite. (Henry Meige.) Sur le même cliché on a fait deux poses successives pour les deux positions du corps. Le bassin et les membres inférieurs n'ont subi qu'un déplacement insignificant.

To face page 334.

CHAPTER XXV

SCIATIC SCOLIOSIS

> " But Vulcanus of whom I spak
> He hadde a courbe upon the bak
> And therto he was hepe halt."
>
> GOWER, *Conf. Am.*, v. 956.

THE fact that divers forms of scoliosis may complicate the various types of *sciatica* was long since drawn attention to, more especially by physicians of the French school.

Pointed out in the first instance by Lagrelette and Dumollard, they were the object of especial study on the part of Charcot, Babinski, Brissaud, and others.

It is to Brissaud that we are indebted for the recognition of a *homologous* scoliosis as the outcome of sciatica, and to Higier and Remak for drawing attention to the still rarer form, *alternating* scoliosis, in the same association.

This reference to the historical aspect of the subject, brief as it is, must at least include an allusion to the very exhaustive studies of their pathogeny contributed by Phulpin and Lamy.

Classification.

Three main varieties of sciatic scoliosis have been distinguished:

1. Crossed scoliosis.
2. Homologous scoliosis.
3. Alternating scoliosis.

To these may be added the, we believe, solitary instance, recorded by Phulpin, in which a condition of *kypho-scoliosis* was observed. Of the first three named types, *crossed scoliosis* is the most frequently encountered, and next in order of frequency comes the *homologous scoliosis* of Brissaud, and lastly *alternating scoliosis.*

While these spinal malpositions, in our experience, crop up with astonishing frequency in the subjects of sciatic pain, we cannot help feeling that as a nosological term it is somewhat misleading, and needs more exact definition.

For, as currently interpreted, it has certainly engendered the idea that this spinal deviation is a prominent, and, as some would appear to think, an integral, feature of *primary* forms of sciatica.

But for ourselves we venture to suggest that on more careful examination it will be found that, though a scoliosis may develop in a primary sciatica, its incidence is infinitely more common in those of *secondary* origin.

Albeit that authorities of repute—Phulpin, for example—think differently may be gathered from the fact that this observer, out of a series of eighty-three cases of sciatica, found only one instance in which there was a total absence of any spinal curvature.

In a later section we shall, however, endeavour to reconcile the divergent opinions regarding the incidence of scoliosis in sciatica, and shall indicate the many sources of fallacy that may arise in this connection.

Mode of Evolution.

This can only be described as erratic, for while as a rule scoliosis does not develop save in cases of some standing, yet, on the other hand, Babinski and others have observed the condition to supervene within forty-eight hours of the onset of sciatica. Nor can it be said that its relationship to the actual degree of the pain is any less inconstant; for while more prone to develop in severe types, yet we ourselves have observed the establishment of such a curvature even in slight attacks of sciatic pain. While, therefore, no constant relationship exists either in regard to duration or severity of pain, in our experience these scolioses at any rate do not develop until *after* the onset of pain. Happily, in the same way, with its cessation the scoliotic curve as a rule gradually vanishes. But we have known it prove somewhat obstinate, the deformity remaining *in statu quo* for a considerable time, even after all subjective symptoms have ceased to give trouble.

Where such postural malposition exists, it can, if seen at an early stage, be corrected by appropriate exercises, but in exceptional cases the scoliosis may become fixed through retraction of the fibro-tendinous tissues of the muscles.

Berbez and Texier, to wit, have noted the persistence of such vicious attitudes even as long as fourteen and eighteen years after the attack of sciatica. This is, of course, in keeping with what one observes in simple lateral curvature if uncorrected. For here also, as a consequence of the secondary adaptive changes which take place in the muscles, vertebral bodies, and related ligaments, the deformity becomes permanent.

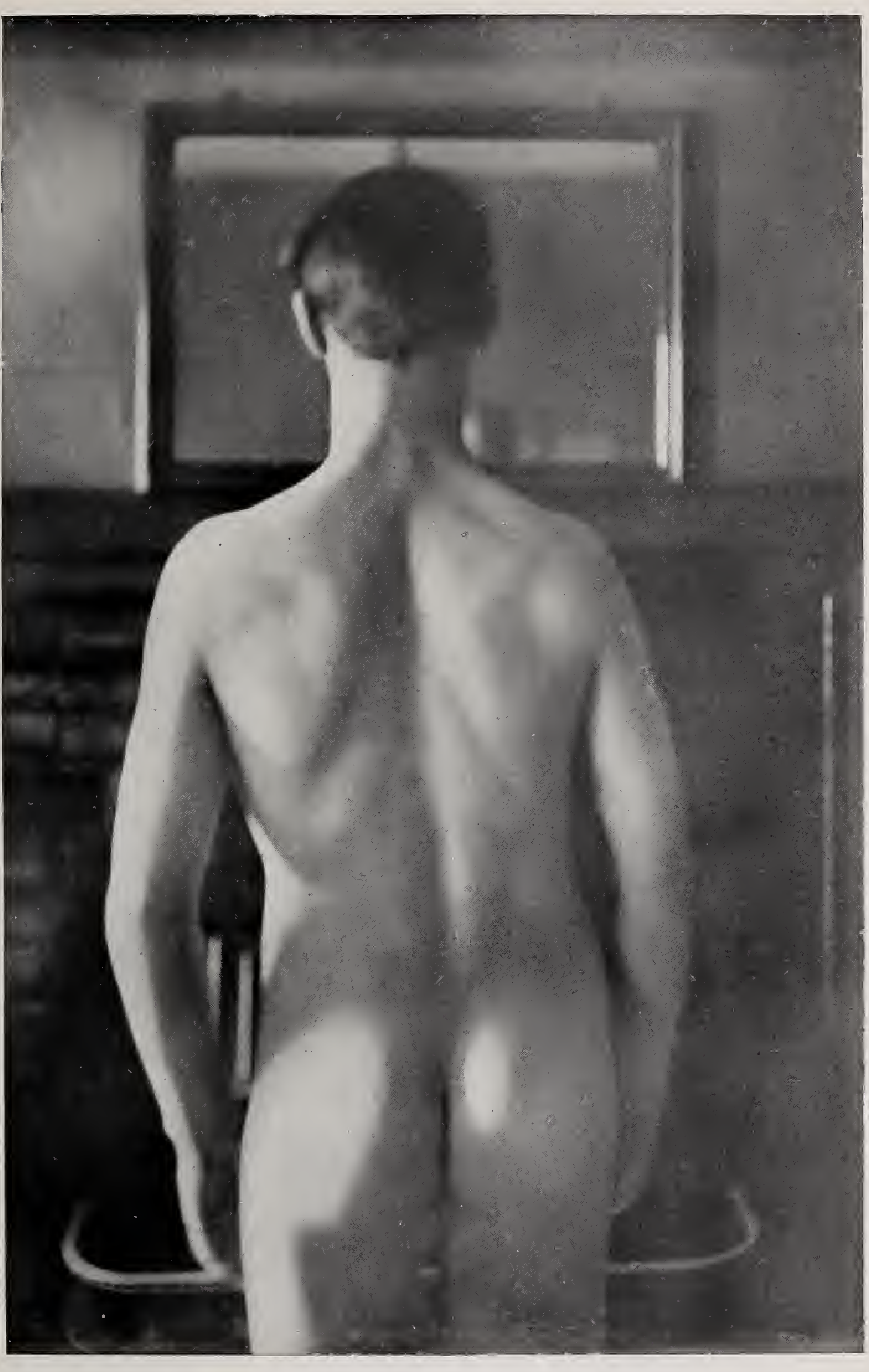


FIG. 67.—Neuralgia of left sciatic trunk. Note that the concavity of curvature faces towards affected side. (Homologous scoliosis infrequent in trunk sciatica.)

To face page 336.

In conclusion, these sciatic scolioses have not, we think, received the degree of attention their importance merits, and the clinical examination of no case of sciatica can be considered complete in which their presence or absence has not been ascertained.

Descriptive Account.

1. *Heterologous or Crossed Scoliosis.*—In this, the most frequent variety of spinal deformity, a curvature is developed in the dorso-lumbar region of the column, the *concavity* of which looks towards the side of the unaffected or healthy limb.

2. *Homologous or Reciprocal Scoliosis.*—Here again the same section of the vertebral column is concerned, but in this case the concavity of the curvature faces in the opposite direction—viz., towards the affected limb.

3. *Alternating Scoliosis.*—This variety, originally described by Remak and Higier, derives its name from the fact that the curvature, at first homologous, is subsequently replaced by a heterologous scoliosis.

This serial variation in the direction of the curve is extremely rare, but through the kindness of the editor of the French journal *Nouvelle Iconographie de la Salpêtrière* we are enabled to reproduce the photograph of a case of this nature contributed to its pages by Dr. Henry Meige.

Additional Features.

A *compensatory* curvature may develop at a level above the dorso-lumbar vertebræ in the dorsal region, this being the outcome of an endeavour to bring back into the vertical line the upper portion of the trunk.

In very pronounced cases of deformity a similar curvature may develop in the cervical region, the result of a like attempt at mechanical readjustment.

Pelvic Displacements.—In the majority of instances—viz., of crossed scoliosis—the pelvis will be found to be *depressed* on the side of the disabled limb. As a result of this, the gluteal fold on the same side lies at a lower level, while the crease between the nates, instead of being vertically placed, at its upper end inclines obliquely towards the affected side.

A little reflection makes it clear that the asymmetrical descent of the pelvis is the natural outcome of the pose habitually assumed by the patient when erect.

As we have seen, to obviate extension of the irritable nerve trunk, the patient flexes his knee, and for the same reason his hip-joint. Consequently the pelvis on that side must be lowered, if it be desired that the plantar surface of the foot shall rest on the ground.

Moreover, to enable this to be achieved, the sound limb must be correspondingly shortened either by abduction or adduction, more commonly the former. As a consequence of this pelvic tilt, the superior portion of the trunk lists over towards the healthy side, determining a very distinct dorso-lumbar curvature whose concavity faces towards the sound side.

Rare Pelvic Distortions.—While in the majority of instances the pelvis is depressed on the side of the disabled limb, this is not invariably the case. For, as Charcot long since pointed out, the pelvis may remain horizontal, or even undergo slight elevation on the affected side, but Plate states that this only occurs in exceptionally muscular persons, the subjects of crossed scoliosis.

Rotation of Trunk.—Babinski has pointed out that in some cases the superior and inferior portions of the trunk may undergo rotation in opposite directions, and this independently of the site or severity of the pain. Thus, to wit, the right shoulder may be thrust forward, while simultaneously the iliac crest on the same side is drawn backwards, or the inverse procedure may occur.

Detection of Crossed Scoliosis.

The existence of crossed scoliosis can be demonstrated in one of two ways. A plumb-line may be dropped from the occipital protuberance of the patient standing erect, when, if the curvature exists, it will be found that, instead of falling between the heels, it inclines more or less towards the healthy foot, grazing the heel or even the outer border.

Or the anterior superior iliac spines may be joined by a line, from the mid-point of which another line is drawn vertically downwards. If crossed scoliosis exists, the vertical line will be seen to list towards the painful side.

Factors influencing Existence of Scoliosis.—The spinal curvature being due to the tilting of the pelvis, it follows that, if the tenderness of the nerve trunk will permit of sitting squarely on the buttocks, the scoliosis will temporarily disappear, but only to reappear when the erect posture is resumed.

Plate of Hamburg has suggested a novel way in which this feature can be demonstrated. The patient is made to kneel on the ground, and is then told to sit back and squat on his heels.

If this be done, the scoliosis, so he states, vanishes; but if the subject rises again to his knees, so that the hips are once more extended, the original tilt of the pelvis reasserts itself, and the scoliosis promptly reappears in its wake.

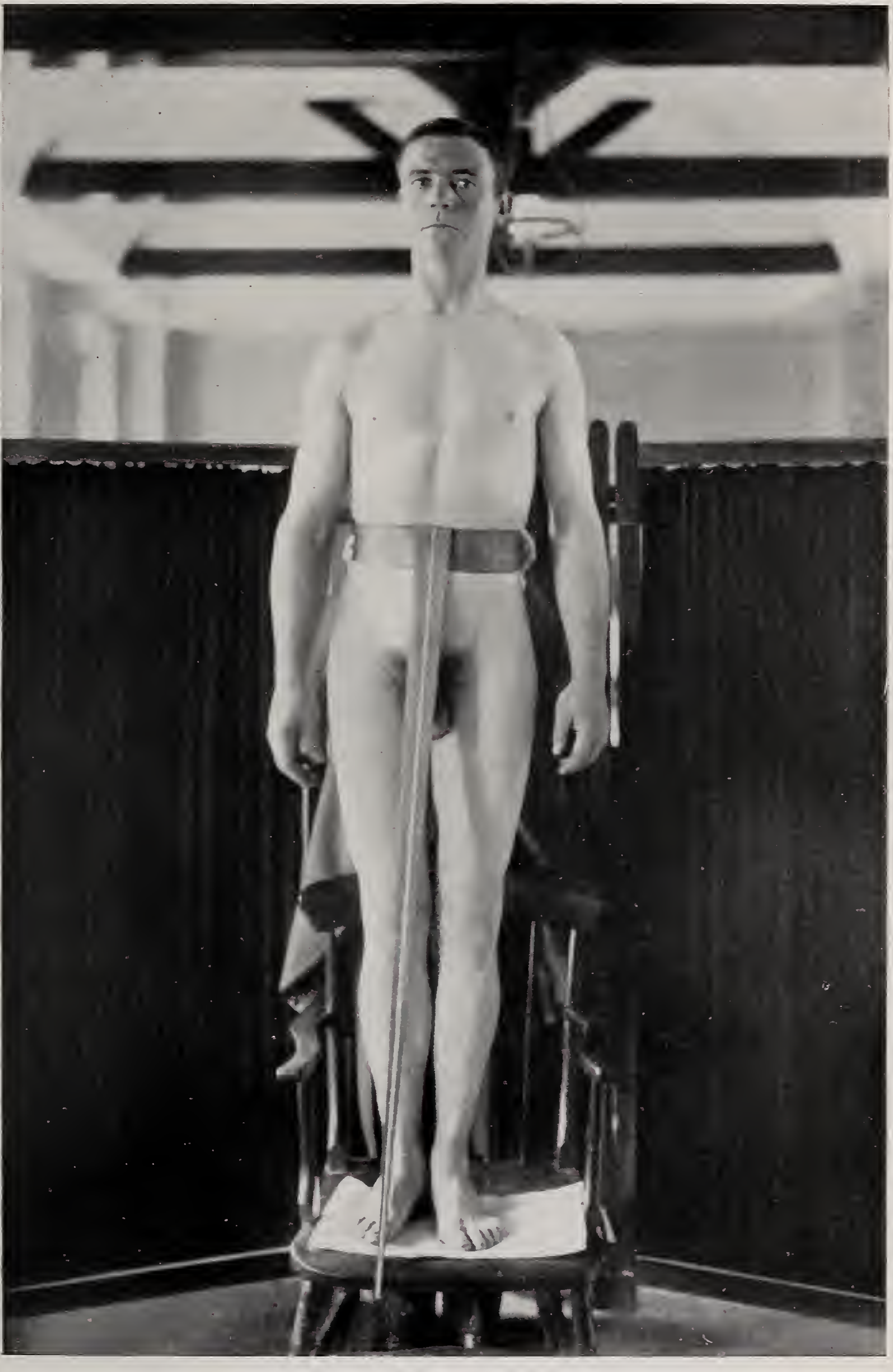


Fig. 68.—Detection of crossed scoliosis. Note tilting of pelvis and trunk and deflection of vertical band towards affected limb.

To face page 338.

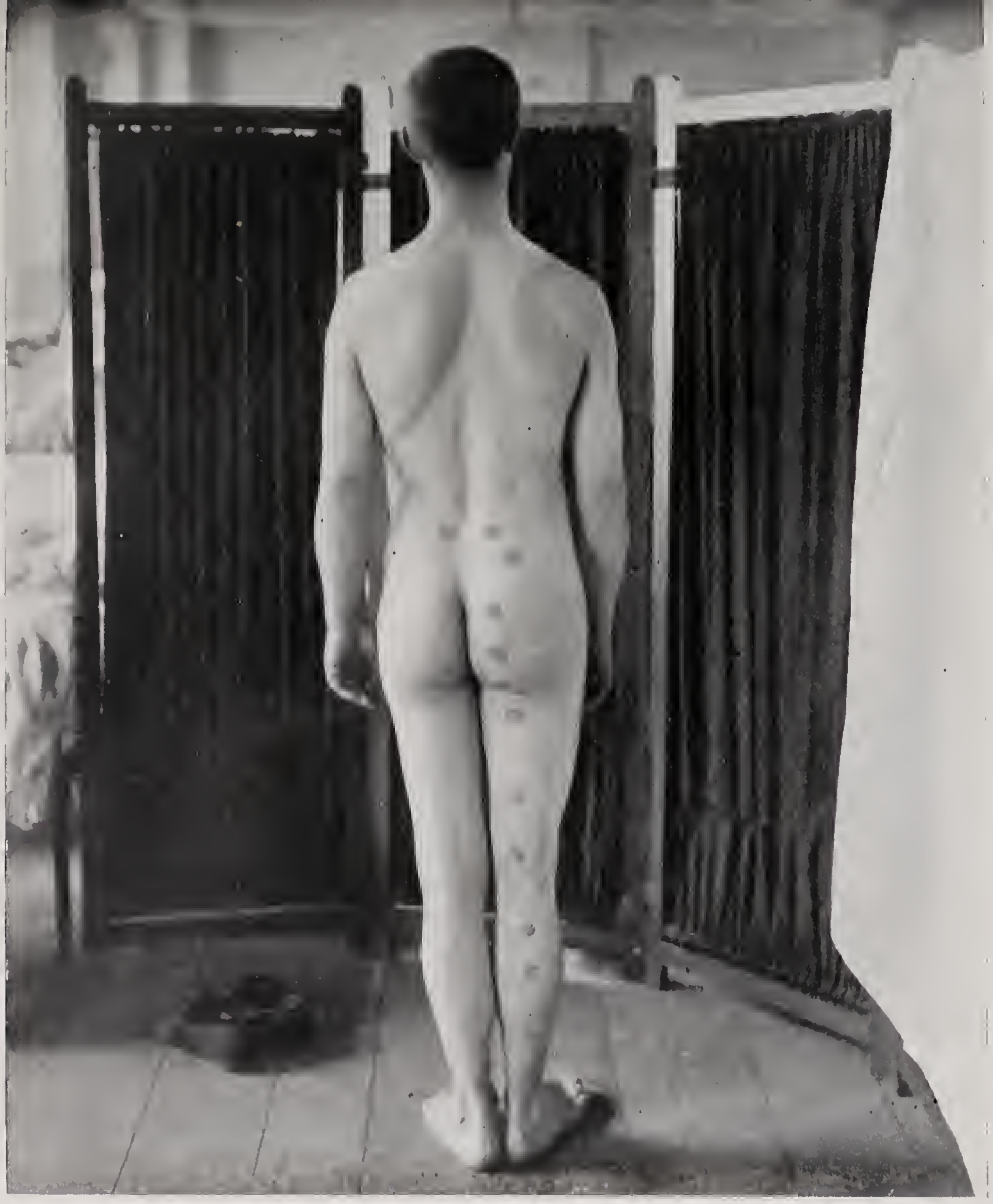


Fig. 69.—Right-sided sciatica. (Heterologous scoliosis.) Concavity of dorso-lumbar curvature faces unaffected or healthy side. Trunk is tilted to unaffected side so markedly that the arm hangs away from unaffected side, while on opposite side arm is closely applied.

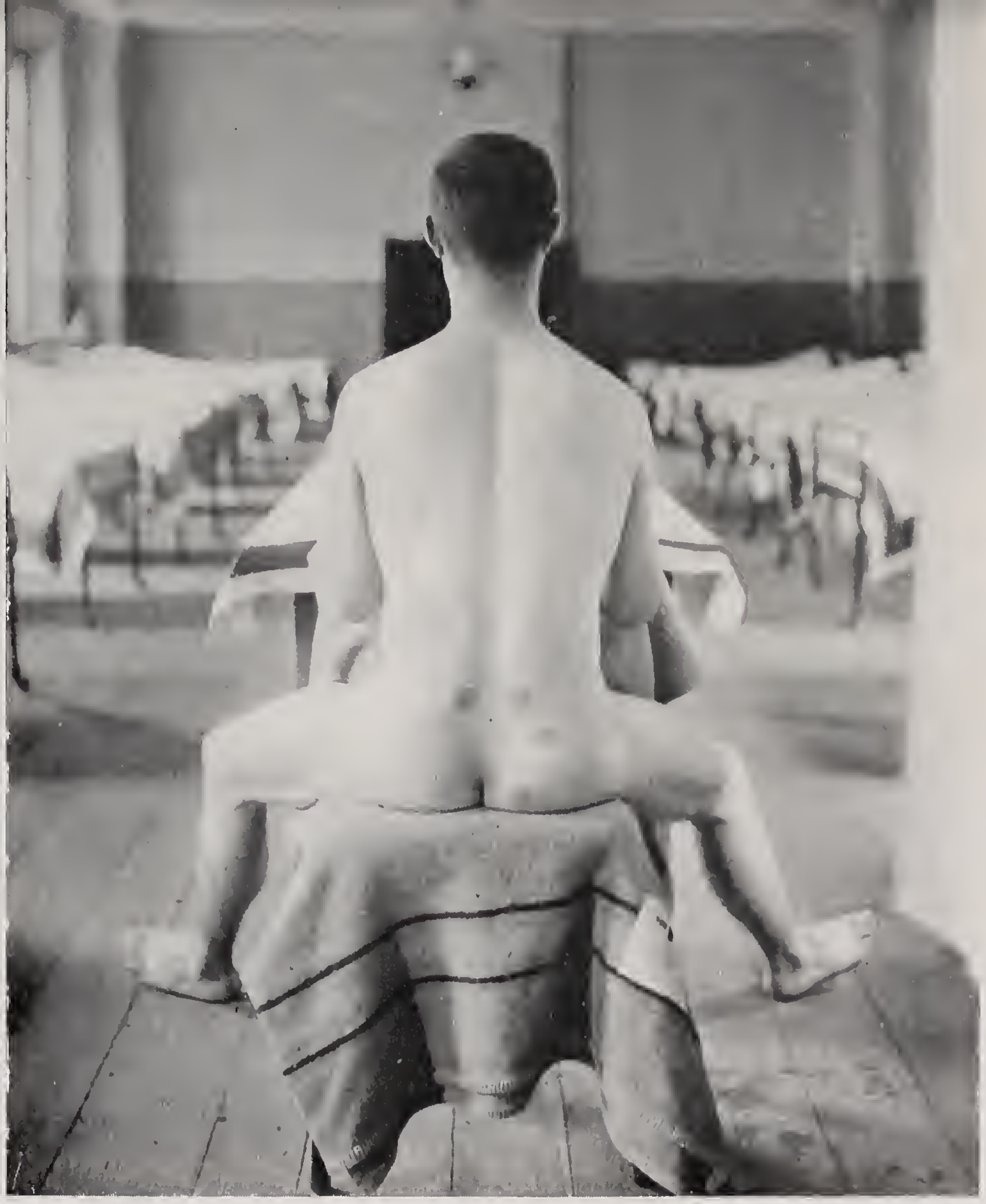


Fig. 70.—Heterologous scoliosis. Note disappearance of curve on sitting, and thus withdrawing body weight.

To face page 338.

We have repeatedly performed this manœuvre in our own cases, but it is by no means a satisfactory method by which to effect disappearance of the curve. Indeed, in any but the mildest cases of sciatica, the curvature, far from disappearing, is but too frequently maintained, or even exaggerated. This we attribute to the fact that it is extremely difficult for a subject with a severe sciatica to find adequate and easy support when squatting on his heels. Moreover, on the side actually affected, the heel, projecting into the buttock, aggravates the pain by the pressure thus produced.

A far more satisfactory, if less dramatic, plan is to place the patient astride a chair, as shown in the accompanying photograph, when the curvature vanishes, to reappear, of course, on the assumption of the erect position.

In regard of these sciatic scolioses, Lorenz has drawn attention to the fact that any attempt to forcibly correct the vicious attitude is strongly resisted by the spastic contraction of the spinal muscles. Moreover, should severe pain be present, even suspension of the patient does not lead to obliteration of the primarily lumbar scoliotic curve, though the compensatory dorsal curve is by this same measure eliminated.

Plate draws attention to another peculiarity best noted when the patient is observed in profile. It will be seen then that the trunk as a whole inclines forwards with the object of flexing the hip, and thus relaxing the psoas. As a consequence of this forward thrust of the trunk at the hip-joint, the extensors of the articulation, particularly the gluteus maximus, undergo increased strain, readily demonstrable by palpation, and giving rise to marked dimpling of the surface of this muscle.

Suggested Modes of Origin.

Numerous theories have been advanced by various writers in their attempt to supply a reasonable explanation of these spinal deformities.

Crossed Scoliosis.—The most obvious solution would appear to be that the patient, in his instinctive endeavour to ease the disabled limb, lists over, and by this ruse displaces his centre of gravity to the sound side.

Ehret, however, holds that, as a result of the patient's effort to reduce the tension on the affected nerve, the leg of that same side is flexed, abducted, and rotated outwards at the hip-joint. By this postural artifice the space between the iliac crest and the false rib is widened, and he believes the scoliosis to be the outcome of the change of position which the leg undergoes in company with the pelvis.

Another view, held by Mann, would refer the scoliotic curve of the spine to a weakened or paretic condition of the erector spinæ muscle on the affected side.

Again, the sciatic nerve, as we know, emerges beneath the lower edge of the pyriformis muscle, and Lesser believes that the vicious attitude is assumed by the patient in order to diminish the pressure exerted on the sensitive trunk by the inferior margin of this muscle.

For our own part, we are inclined to believe the first-named view to be probably the most reasonable, as it is the most obvious mode of explanation.

Quite recently Plate of Hamburg has advanced a very carefully-thought-out view as to the evolution of crossed scoliosis.

To explain his hypothesis, we must recall the fact that the sciatic trunk springs from the last two lumbar as well as the first three sacral roots.

Now, the branches of the lumbar plexus in their downward course pass through the substance of the psoas, and Plate contends that in cases of sciatic neuritis an extension upwards of the morbid process to the lumbar roots not infrequently happens.

As a result of this, a condition of myalgia of the psoas muscle ensues; hence, as a matter of defence, the patient instinctively adopts an attitude of slight flexion of the hip-joint on the affected side. This posture of flexion, of course, leads to shortening of the lower extremity on this side.

If now the sole is to be planted squarely on the ground when the patient stands erect, it follows that the limb on the healthy side has to be shortened accordingly.

This end may be attained in one of two ways, either by abduction or adduction of the unaffected limb, the former being the ruse usually adopted. This manœuvre leads to a corresponding depression of the pelvis on the same side.

Now, the equilibrium of the trunk is necessarily disturbed by this pelvic tilt, and for its readjustment the upper portion of the trunk develops a list towards the side on which the pelvis is higher.

In this way is the development of the more common or crossed type of sciatic scoliosis accounted for, the dorso-lumbar curvature in which has its concavity facing toward the sound or healthy side.

Several writers—Schudel, Kocher, etc.—have advanced the view that on the affected side a relaxation of the erector spinæ muscle ensued, a defensive precaution adopted in order to defend from pressure the affected sensory branches which traverse its substance.

Homologous Scoliosis.—This, according to Lortat-Jacob, is the type almost invariably associated with *radicular* sciatica.

Nicoladoni has suggested that in the presence of this radicular neuritis the patient instinctively attempts to widen the intravertebral foramina, thus diminishing the pressure upon the emerging nerve roots.

Brissaud and Lamy hold that, while crossed scoliosis is due to retraction of muscles on the healthy side, homologous scoliosis, on the other hand, is the outcome of contracture of the muscles on the affected side.

These observers maintain in explanation that the contracture is not limited to the muscles supplied by the sciatic, but implicates also those lateral muscles of the trunk which own allegiance to branches of the lumbar plexus.

Again, according to Soupault and Bruhl, homologous scoliosis occurs in those cases where the neuralgic pains fall upon the lumbar plexus and the upper portion of the sciatic trunk.

They would invoke an instinctive flexion on the part of the patient, having for its object the relaxation of the pelvic muscles, whence the establishment of an homologous scoliosis.

On the other hand, they consider that in those instances in which the lower portion of the sciatic is involved, with as a consequence pain in the leg, a crossed scoliosis develops.

Fischer and Schoenwald are of opinion that homologous scoliosis occurs as a result of neuralgia of the anterior branches of the lumbar nerves; while crossed scoliosis they opine to be due to sensory troubles in the posterior branches of this particular plexus.

The foregoing summary of the various theories is by no means an exhaustive one, but their very multiplicity alone sufficiently indicates that the subject is a very contentious one.

For our own part we would withhold judgment as to their respective merits, contenting ourselves with the reflection that this homologous type, whatever be its mode of evolution, is certainly more common in the radicular variety of sciatica.

Sources of Fallacy.

The interest attaching to these varieties of sciatic scoliosis has led us to a somewhat lengthy digression, but there are certain possible fallacies of which perhaps too little notice has been taken.

While admitting the comparative frequency with which slight curvatures are to be met with in sciatica, it must not be forgotten that such scolioses are much more constant in *secondary* sciaticas. Thus, for example, sciatic pain is extraordinarily common in *osteo-*

arthritis of the hip, and, as we hope to show later, even in the villous or pre-osteophytic stage of this affection.

In its initial stages this hip disorder is very easily overlooked unless the patient is examined with meticulous care, and as in such cases a slight list very often develops, it may quite easily be erroneously interpreted as secondary to a simple or primary sciatica.

For the same reason it is highly necessary, before arriving at the diagnosis of simple sciatic scoliosis, that we should exclude those cases in which the sciatic pain as well as the curvature have ensued in sequence to *relaxation of the sacro-iliac synchondrosis*, or to infective, atrophic, or hypertrophic arthritis of this articulation, as well as tuberculous disease of this synchondrosis.

Far more commonly, we are certain, than is realized do such conditions of sacro-iliac strain or disease pass unrecognized, and, consequently, their associated and purely secondary sciatic pain is wrongly interpreted as being primary.

Under such a misconception, it naturally follows that the scoliosis almost invariably present is in like fashion misconstrued as an example of a primary sciatic scoliosis.

Again, it must be recollected that referred pains along the sciatic regions are very commonly " static " in origin, and attributable to *pronated or everted feet, or to asymmetry in length of the lower limbs*, either congenital or acquired inequality through malunited fracture.

Now, it cannot be gainsaid that such static deformities or disproportions in the lower extremities are very readily and very commonly overlooked, and their sciatic pain and associated scoliosis wrongly classed as being primary in nature.

In conclusion, therefore, we would urge that before admitting any lateral curvatures to the category of pure sciatic scoliosis, the utmost care should be taken to exclude these by no means uncommon sources of fallacy.

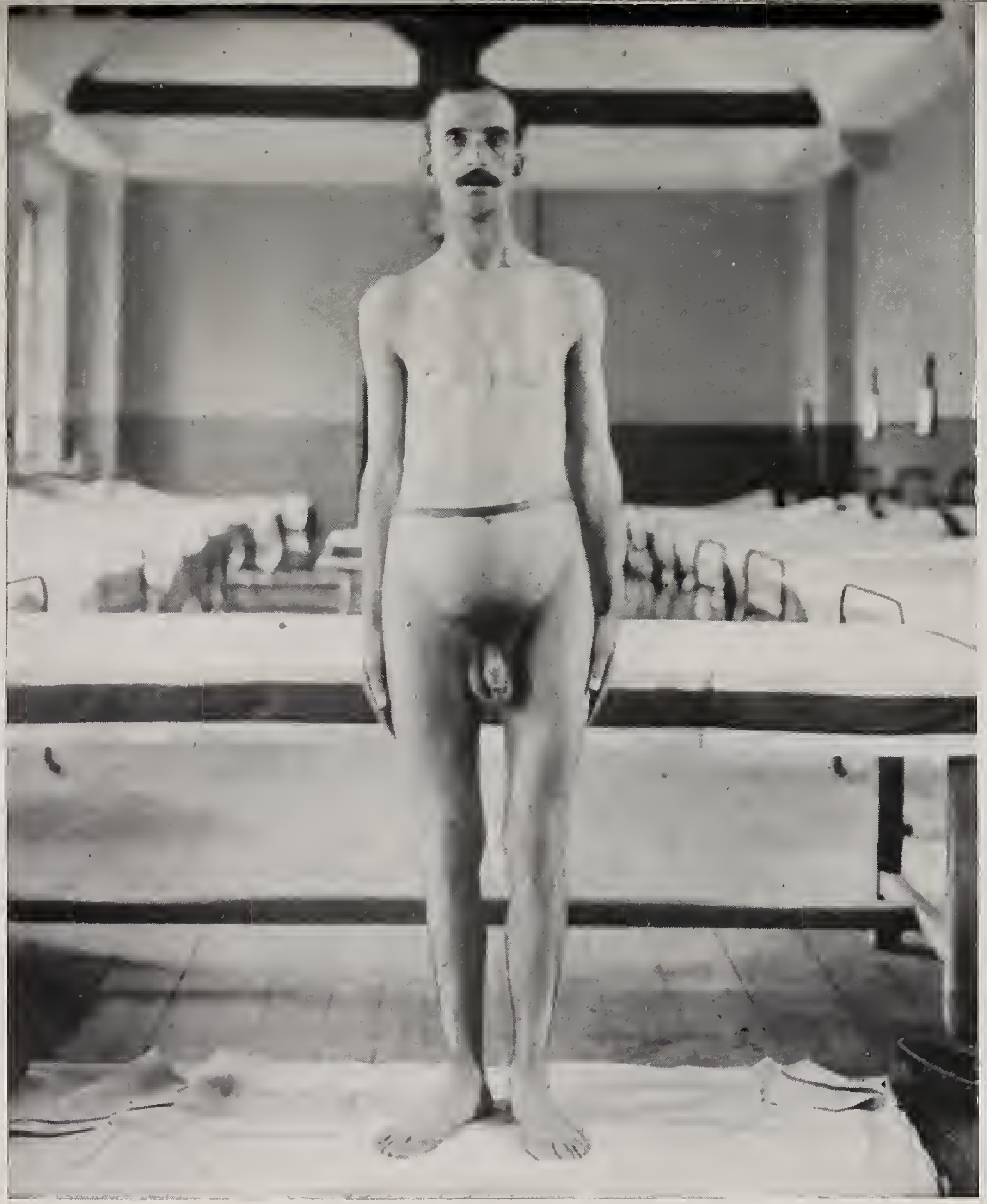


FIG. 71.—Left sciatic neuritis. Note elevation of pelvis on affected side in opposition to the usual depression of pelvis on the side of disabled limb.

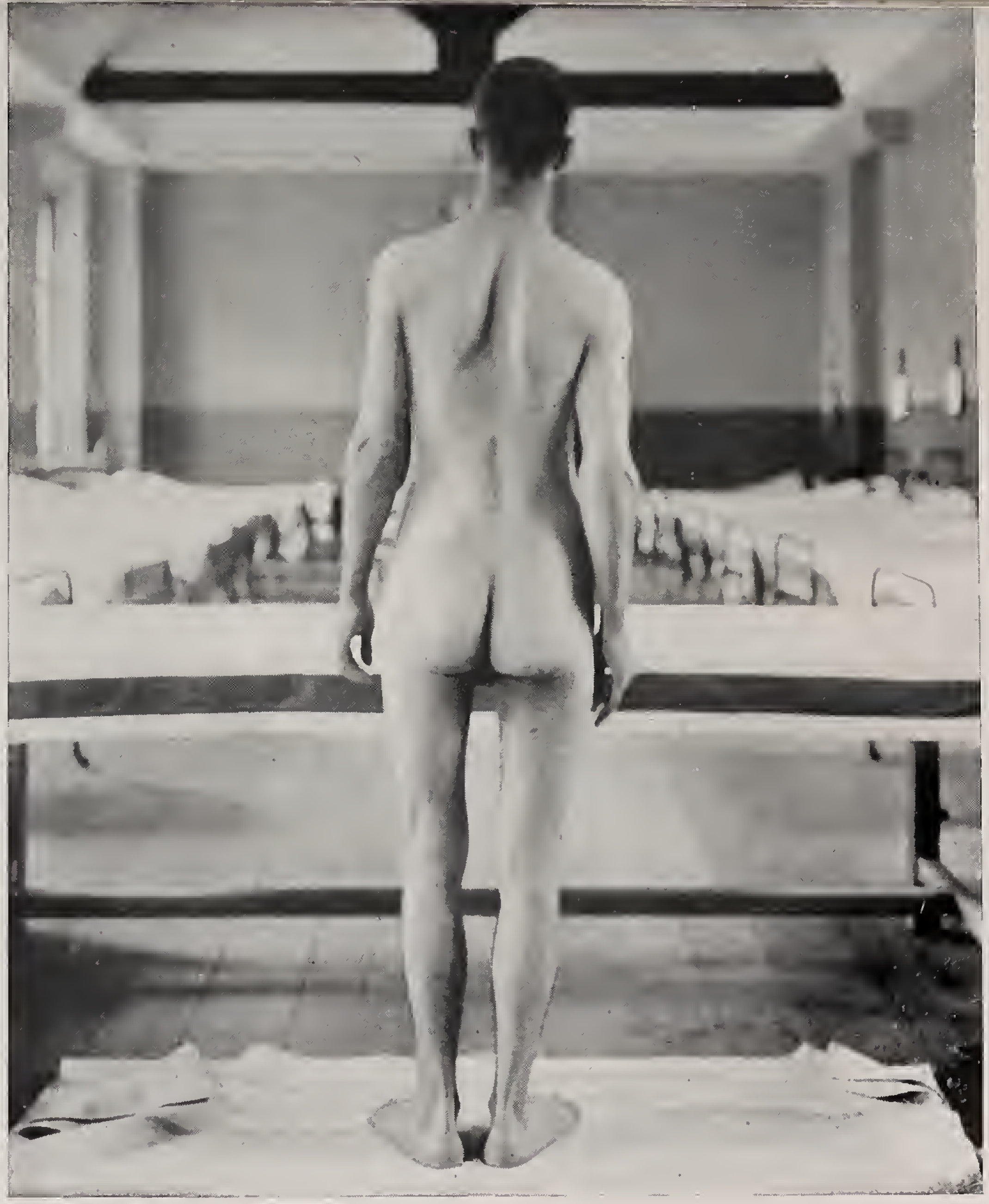


FIG. 72.—Left sciatic neuritis. Note marked muscular wasting of left limb, also list of trunk to unaffected side as shown by elevation of left shoulder. Observe scar below crease of left buttock, the result of operation for stretching.

To face page 342.

CHAPTER XX

INCOMPLETE OR PARTIAL AND BILATERAL SCIATICAS, ALSO THOSE OF SPECIAL ETIOLOGY

Incomplete or Partial Types of Sciatica.

As opposed to the trunk variety, in which the morbid process is distributed impartially over the nerve, in the incomplete types it is restricted to one or other of its branches.

Peroneal or External Popliteal Type.

This nerve arises from the dorsal divisions of the anterior branches of the fourth and fifth lumbar and the first and second sacral.

One of the main branches of the sciatic trunk, it supplies the tibialis anticus, extensor longus digitorum, extensor hallucis longus, the peroneal muscles, and the extensor brevis digitorum.

At the same time it is responsible for the innervation of the skin over the outer aspect of the leg from below the knee to the metatarso-phalangeal joints of the toes.

Etiology.—Neuralgia of the external popliteal nerve seems to have been originally described by Bianchi, and Lefebvre has also contributed much to our knowledge of this condition. It was observed first by them as a sequel to compression of the sacral plexus by the fœtal head during difficult or instrumental labour.

This nerve, indeed, appears especially liable to be singled out by *infective, toxic, or traumatic agencies.* Even in instances where the sciatic nerve is compressed by intrapelvic growths, the pain and other symptoms may be strictly confined to, or be most prominent in, the area of distribution of this particular branch.

In explanation of this peculiarity, we may mention that Aeby has shown that, while in the pelvis, the fibres of the peroneal, though lying in the same sheath as the rest of the sciatic, are even at this level grouped together into a special trunk. Moreover, lying as they do in close proximity to the bone at this site, they are therefore more sensitive in their response to pressure.

Again, Gerhardt has proved that in animals after death electrical excitability is more quickly lost in the extensors of the foot, and the same observer has also shown that in lesions of the sciatic trunk degenerative changes are first to be observed in the peroneal branch.

The relatively low power of resistance on the part of this nerve is forced upon our notice in everyday life.

Thus, in sedentary persons unused to anything beyond an occasional walk, it is upon the anterior tibial that the chief strain falls when any unwonted pedestrian efforts are undertaken, and the sensation of fatigue experienced in this nerve under such circumstances is familiar to most of us.

Apart from these intrinsic peculiarities, it is throughout its course in the leg very favourably disposed for the effective action of pressure and trauma.

Thus any extraordinary or violent exercise, such as jumping, may result in the compression of the nerve as it lies between the tendon of the biceps and the fibula.

The same result, but more gradual, may arise in those who habitually work in a kneeling posture, such as pipe and asphalt layers, and so forth. Lastly, inasmuch as the nerve is very superficially placed where it passes round the head of the fibula, it is easily injured by blows, and where fracture of this bone occurs it may be involved in the callus.

Clinical Symptoms.—These will, of course, vary, according to whether the nerve is attacked by *neuralgia* or is the seat of *neuritis*. In the former instance there will simply be periodic and intermittent pain and paræsthesiæ in its area of distribution, while to these may be superadded *pseudo-paresis* of the affiliated muscles.

If actual *neuritis* be present, in addition to constant pain discrete areas of anæsthesia will develop in the sensory distribution of the nerve. They will be situated on the outer half of the anterior and posterior surfaces of the leg, and the dorsal surface of the foot and toes, excepting along its inner border and the side of the great toe.

On the *motor* side, such a patient in order to clear the ground adopts a " steppage " gait, owing to weakness or palsy of the anterior tibial muscles, and associated relative overaction of the calf muscles.

In conclusion, it is extremely difficult to sharply divide this variety from the *trunk* type of sciatica, for, as we have seen, some of the more striking features of the latter are attributable to involvement of this branch.

Our differentiation will, of course, depend upon the history,

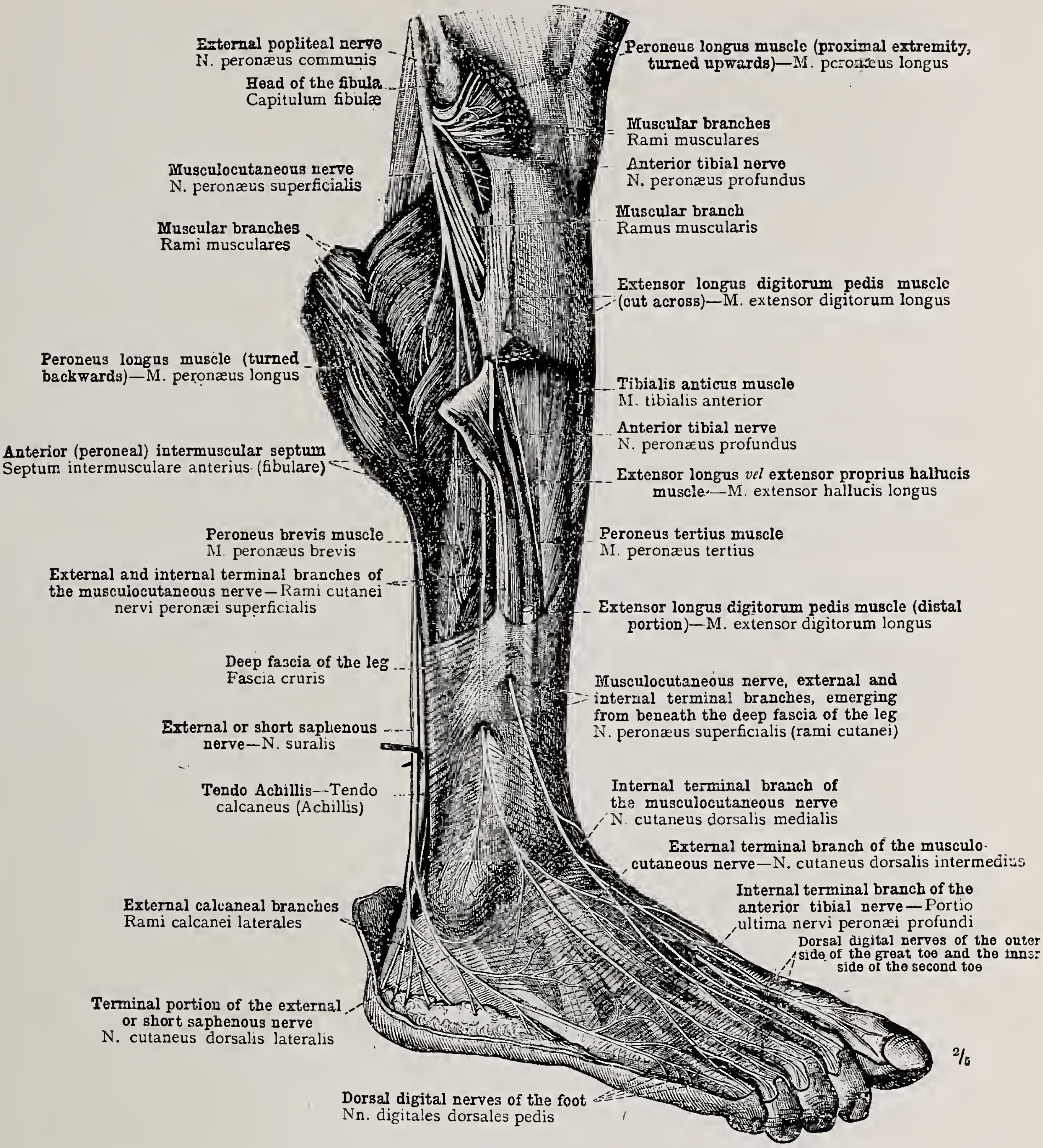

External popliteal nerve
N. peronæus communis
Head of the fibula
Capitulum fibulæ
Musculocutaneous nerve
N. peronæus superficialis
Muscular branches
Rami musculares
Peroneus longus muscle (turned backwards)—M. peronæus longus
Anterior (peroneal) intermuscular septum
Septum intermusculare anterius (fibulare)
Peroneus brevis muscle
M. peronæus brevis
External and internal terminal branches of the musculocutaneous nerve—Rami cutanei nervi peronæi superficialis
Deep fascia of the leg
Fascia cruris
External or short saphenous nerve—N. suralis
Tendo Achillis—Tendo calcaneus (Achillis)
External calcaneal branches
Rami calcanei laterales
Terminal portion of the external or short saphenous nerve
N. cutaneus dorsalis lateralis
Dorsal digital nerves of the foot
Nn. digitales dorsales pedis
Peroneus longus muscle (proximal extremity, turned upwards)—M. peronæus longus
Muscular branches
Rami musculares
Anterior tibial nerve
N. peronæus profundus
Muscular branch
Ramus muscularis
Extensor longus digitorum pedis muscle (cut across)—M. extensor digitorum longus
Tibialis anticus muscle
M. tibialis anterior
Anterior tibial nerve
N. peronæus profundus
Extensor longus vel extensor proprius hallucis muscle—M. extensor hallucis longus
Peroneus tertius muscle
M. peronæus tertius
Extensor longus digitorum pedis muscle (distal portion)—M. extensor digitorum longus
Musculocutaneous nerve, external and internal terminal branches, emerging from beneath the deep fascia of the leg
N. peronæus superficialis (rami cutanei)
Internal terminal branch of the musculocutaneous nerve
N. cutaneus dorsalis medialis
External terminal branch of the musculocutaneous nerve—N. cutaneus dorsalis intermedius
Internal terminal branch of the anterior tibial nerve—Portio ultima nervi peronæi profundi
Dorsal digital nerves of the outer side of the great toe and the inner side of the second toe
2/5

Fig. 73.—The distribution of the external popliteal nerve, its branches to the peroneus longus and brevis muscles, and its cutaneous branch to the dorsum of the foot—the musculocutaneous nerve. (Toldt's Atlas.)

To face page 344.

the accurate localization of the pain to the track of the external popliteal branch, and the immunity of the trunk portion of the sciatic nerve.

In addition, we have, to assist our differentiation, the exact localization of the motor disabilities and sensory changes to the area of innervation of this particular nerve.

Other Varieties of Partial Sciatica.

In *neuritis of the small sciatic trunk*, the nerve being entirely sensory, pain and paræsthesiæ will be the sole symptoms, if it be attacked by neuralgia.

If, however, a genuine neuritis be set up, plaques of anæsthesia will become manifest over the back of the thigh in its middle third, and also over the upper half of the calf.

Only isolated examples of *neuritis of the posterior tibial* have been recorded. In regard to it, Oppenheim states the interesting fact that the ankle-jerk may be abolished even when the degree of the neuritis is slight.

This authority also remarks that he has often found cases of *diabetes* and *alcoholism* in which its absence was the solitary sign pointing to an affection of the nervous system.

Seeligmuller and Nonne are among the few who have noted this form of partial sciatica in which the chief symptoms are referable to *paresis or palsy of the calf muscles*, which on electrical stimulation give the reaction of degeneration.

The terminal twig of the *anterior tibial branch* supplying the great toe is sometimes singled out, and because of its localization is likely to be confused with *gout*.

It should, however, be easily distinguished by the absence of heat, redness, and swelling, and the tolerance which the joint displays towards movement.

Lastly, in *plantar neuralgia*, as the name implies, the pain is limited to the distribution of the plantar nerves, and it may be of almost unendurable severity, but fortunately its occurrence is extremely exceptional.

In considering its diagnosis, it should always be recollected that plantar hyperæsthesia is very frequent in gout, alcoholism, and even hysteria, while it need hardly be added that static deformities, such as flat feet, should always be excluded.

Care also should be taken to exclude the presence of bony outgrowths on the under-surface of the os calcis, inflammatory changes in the bursa beneath the tendo Achillis, and lastly, foreign bodies.

Trunk Sciatica of Bilateral Distribution.

This may take the form either of a *neuralgia or a neuritis*, and bilateral sciatic pains, by reason of their comparative rarity, should immediately arrest attention.

Sciatica in the vast majority of instances is *unilateral*, and it is important to grasp the fact that, when we talk of bilateral sciatica, we mean a *simultaneous* affection of both sciatic trunks.

The distinction is of some moment, inasmuch as successive involvement of one nerve after the other is by no means infrequent, such a sequence, in our experience, being more common when the sciatic pain has been preceded by lumbago.

Symmetrical sciatic pains should always suggest the presence of a toxic agent, *diabetes, alcohol, or syphilis*, while in some cases influenza appears responsible. We may add that in a series of twenty-one examples of bilateral sciatica in nine—or 43 per cent.—a gouty diathesis was prominent.

Apart from the foregoing, bilateral sciatica is a feature of *lesions of the cauda equina or the spinal cord itself*, or of some morbid process, syphilitic or tuberculous, in the meningeal coverings of the nerve roots.

It must not be forgotten, too, that malignant and tuberculous disease of the spine or sacrum, also bilateral osteo-arthritis of the hip may give rise to symmetrical sciatic pains.

Lastly, *intrapelvic growths* and inflammatory processes may owe their initial recognition to pain along the sciatic trunks.

In instances due to a toxic blood state the pains from the onset may be simultaneously experienced in both nerves.

But where secondary to intrapelvic growth, it may be in the initial stages unilateral, pending extension of the morbid process to the opposite nerve trunk.

Sciatic pain occurring in sequence to disease of the spinal column, cauda equina, cord, or due to pressure from intrapelvic growths, often shows, too, the following peculiarity:

It is usually *peripheral in distribution and unaccompanied by tenderness of the nerve trunk*, or, if the latter be present, it is usually slight in proportion to the pain.

This dissociation of subjective pain and objective tenderness, whether of bi- or uni-lateral distribution, always indicates the necessity of a thorough examination of the pelvis by the abdominal, rectal, and vaginal routes.

Also the secondary origin of the sciatic pains in consequence of trouble outside the nerve should be suspected, if on extension by Lasègue's method the pain be not markedly aggravated, or perhaps even relieved.

During the examination the spinal column should be investigated, also the state of the hip-joints, while every advantage should be taken of special modes of examination, skiagraphy, sigmoidoscopy, and so forth.

In order to avoid confusion with the "lightning" pains of tabes the reaction of the patellar and Achilles reflexes should be ascertained, likewise the functional state of the sphincters.

The course and termination of bilateral sciatica will obviously depend upon the nature of the underlying cause and its amenability to treatment.

Special Types of Sciatica.

Certain varieties of sciatic neuralgia and sciatic neuritis call for special mention by reason of their *etiological* and *clinical* distinctions.

Diabetic Sciatica.

That such a condition may occur in association with sugar in the urine has long been recognized. It may take the form either of a sciatic neuralgia or a sciatic neuritis.

Sciatic Neuralgia.—As is well known, diabetics, like gouty subjects, are very prone to develop neuralgic affections, the nerves most commonly attacked being the sciatic and the trigeminal.

It is very frequently symmetrical in distribution, and bilateral sciatic pain should always put us on our guard, lest this serious disorder of general nutrition be overlooked.

Sciatic Neuritis.—This is often extremely painful, and is remarkable also in that the subjective paræsthesiæ are slight.

Another distinction consists in the frequency with which the *external popliteal* nerve is picked out, especially in the early stages.

Aldren Turner and Grainger Stewart state that they have met with several instances in which for a long period this branch was alone implicated.

Perforating ulcers have been met with in this connection, and it is worthy of note that they are *painless.* The relative frequency with which such trophic sores appear in bilateral diabetic neuritis renders them especially liable to confusion with tabes dorsalis.

Apart from these peculiarities, diabetic neuritis of this trunk has no especial characteristics; we have the usual muscular wasting, with some sensory impairment, abolition of the ankle-jerk, etc.

The prognosis will, of course, vary with the response of the underlying metabolic fault to dietetic restrictions.

If under their influence the sugar disappears, the nerve condition improves, but otherwise the outlook is gloomy.

Gonorrhœal Sciatica.

This usually takes the form of a sciatic neuralgia, which may arise either during the acute or the chronic stage of urethritis, and it may be accompanied by joint symptoms of similar origin.

Acute Type.—This usually arises during the second or third week after infection. It is usually fulminant in onset, and, according to Fournier, is occasionally attended by intermittent pyrexia.

The pain is often extremely severe, and follows the usual track of the nerve as far as the popliteal space. It does not as a rule last more than two or three weeks, and tends to clear up completely, though it displays a tendency to recur with each attack of urethritis.

It is probable that the so-called *reflex* sciaticas cited in connection with gonorrhœal epididymitis are in reality due to a toxic fibrositis of the sciatic nerve sheath.

Chronic Type.—It is in our opinion not improbable that numerous cases of chronic sciatica too readily ascribed to chill are in reality attributable to a latent gleet.

Lastly, though gonorrhœa may give rise to sciatic neuralgia and neuritis, the former is the more common type, and, as will be shown later on, it appears to be especially related to radicular types of sciatica.

Varicose Sciatica.

Having frequently in the course of practice been confronted with sciatica in association with varices of the lower limb, we would at the same time emphasize and deplore the frequency with which not only the existence, but the significance, of the vascular phenomena are overlooked.

Foreign observers, notably Quénu, claim that this particular type of sciatic pain, by reason of its peculiar symptomatology, is entitled to rank as a distinct variety.

In regard to this point, some researches by Reinhardt and Spalteholz have elicited the important point that the inferior gluteal vein lies directly on the sciatic nerve.

Apart from this, however, we have the fact also that its main tributary, the vena ischiadica, in its upward course along the limb, lies contiguous to or is embedded in the sciatic nerve. Moreover, in the region of the knee the vena ischiadica effects anastomoses with the small saphenous and popliteal veins, and it is at this spot that varices commonly manifest themselves.

Having regard to the fact that other small veins also permeate the nerve, it is clear that in view of this lavish blood-supply any obstruction, mechanical or otherwise, in the venous flow may lead to painful states of the sciatic nerve trunk, though it may be doubted if varices of themselves are adequate to establish anything beyond a sciatic neuralgia.

When, however, definite neuritis has ensued in such an association, Quénu has suggested that it may be due to an *infective phlebitis in the inferior gluteal vein or the vena ischiadica*, with resulting adhesions between the inflamed vein and the nerve sheaths.

In our experience, when the subjects of varicose veins, usually women, complain of pain in the sciatic region, it commonly displays the following characters:

It is invariably moderate in degree, and partakes rather of a feeling of weight, tension, and fulness in the affected limb.

The characteristic feature of this type of sciatica is this: the symptoms disappear readily on lying down, but only to recur again when the standing posture is resumed.

Another distinctive feature that we have frequently recognized is the fact that these persons find that, more than anything else, standing still in the erect position aggravates their suffering. Moreover, and this is very typical, *slow* walking is torture to them, but immediately they quicken their speed their pain is relieved, and as long as they can keep the pace up their discomfort may be trivial or abolished.

Obviously, for this reason they complain very bitterly if they have to carry children or heavy objects, which entail slow progression, as presumably in this instance the upward flow through the veins lacks the aid afforded by rapid rhythmic contraction of the supporting muscles.

It is clear that, if we are to recognize this type of sciatica, the first step is to examine the bare limb, and this not in the recumbent, but in the *erect* position. If then varices are present in the calf or popliteal space, the foregoing characters would render it tolerably certain that we are dealing with a varicose sciatica, a supposition very clearly demonstrated by the relief which follows support of the veins by a bandage, or, failing this, ablation of the varices.

Brissaud's Spasmodic Type.

In 1890 this observer described a clinical type of sciatica the pre-eminent characteristic of which appeared to be the *associated muscular spasms*. Briefly described, its salient features are as follows: The affected limb assumes a peculiar state of rigidity with contracture, and at the same time there is a great increase of myotatic irritability·

While in addition there is present a state of what Brissaud terms " bilateral epileptoid trembling."

With this, too, is correlated a condition of *homologous scoliosis*, all these peculiarities conferring on the victim a peculiar attitude, which Brissaud has graphically compared to that presented by a person conveying a bucket of water with extended arm, while endeavouring at the same time not to wet himself.

Hysterical Sciatica.

This was first described by Achard and Soupault. It may be the sole manifestation of hysteria, but as a rule is accompanied by other stigmata of this nature.

It is distinguished by suddenness of onset, and, according to Phulpin, is occasionally preceded by an apoplectiform attack, or it may follow injury.

The pain complained of is usually indefinite in character and localization, and is characteristically responsive to mental changes. Thus, it may vanish temporarily when the patient's attention is pleasantly diverted, or may become aggravated under depressing circumstances.

Other hysterical phenomena are frequently present, such as polyuria, hemianæsthesia, muscular tremors and spasms, etc.

Lastly, its treatment largely resolves itself into one of suggestion.

CHAPTER XXVII

RADICULAR SCIATICA

Synonyms: Root sciatica; la sciatique radiculaire.

APART from the neuralgic and neuritic types of *trunk* sciatica, there remain for our consideration certain rarer examples, whose features seem to indicate that the *nerve roots*, rather than the trunk of the sciatic nerve, are the primary site of the mischief.

Our own attention was drawn to this possibility some years ago when engaged in the study of sciatic pain, as it occurs in *rheumatoid or atrophic* arthritis.

It is, perhaps, not sufficiently recognized that pain in the sciatic region sometimes *precedes* for a considerable period the appearance of joint swellings in the affected limb.

Our observations were conducted on *asymmetrical* types of atrophic arthritis—*i.e.*, those instances in which the preceding pain and subsequent joint enlargements were restricted to one lower extremity.

The advantage of dealing with such unilateral examples lay in the fact that the sensory changes and reflex reactions in the disabled limb more readily admitted of comparison with those in its opposite and unaffected fellow.

The examination of a large number of cases, and likewise of other control examples of sciatic pain—those not followed by joint swellings—revealed the existence of sensory changes whose areas of delimitation were of *root or segmental* type.

Further evidence pointing in the same direction was derived from the behaviour of the deep, and more particularly the superficial, reflexes.

Etiology.

As far as our own experience goes, we were unable to elicit anything distinctive of this as opposed to other varieties of sciatica. But having regard to the fact that the sciatic pain in our cases was followed or accompanied by joint swellings in the affected limb, we are inclined to favour its infective or toxic origin.

No study, however, of the etiology of radicular sciatica would be complete which did not embrace the exhaustive researches made by Dubarry, Gauckler, Roussy, and more especially Lortat-Jacob, Sabaréanu, and Berthéol.

Apropos of its causation, these last-named observers claim a prominent rôle for *syphilis*, and, according to Lortat-Jacob, it is a pre-eminent cause of the radicular variety, and this both in its secondary as well as in its tertiary stages.

The stress laid by this observer on the rôle played by syphilis is intelligible when we bear in mind that he found evidence of its presence in half the cases recorded by himself and his colleagues.

As to the pathogeny of these syphilitic sciaticas, the suggested explanations differ somewhat. Thus, Fournier believes that, when they arise during the *secondary* stages, lesions similar to those met with in the skin and mucous membranes affect the nerve sheaths, a supposition favoured by the ephemeral character of the sciatica.

Lortat-Jacob, however, considers that, whether the sciatica develops during the secondary or tertiary stages, it is, even in some cases developing in the former period, due to *meningeal* involvement.

Déjerine, writing recently on this form of spinal sciatica, ascribes it to a patchy intradural meningitis, chiefly in the posterior region.

This view as to the meningeal site of the morbid process is rendered all the more probable, having regard to the fact that Debove has shown that the facial palsy which sometimes develops in the secondary stages of syphilis is of meningeal origin.

In the *tertiary* period it is clear that the sciatic pain may result from either meningeal or osseous lesions—viz., gummata or exostoses—implicating the root zones.

In conclusion, our suspicion of a specific origin should always be aroused when we are confronted with a sciatica presenting sensory changes, the localization of which is compatible with a root rather than a peripheral nerve distribution.

Other Etiological Factors.—Of the remaining etiological factors, next in order of frequency comes *alcoholism*, either alone or in association with syphilis, and subsequently *gonorrhœa*, tubercle, and trauma.

It is possible that some of the gonococcal cases find their explanation in the meningo-medullary lesions which have been shown to follow this infection.

For Moltschanoff and Osokin have demonstrated experimentally that the inoculation of animals with gonococcal cultures or toxins may initiate medullary lesions.

As regards tubercle, we may note that Camus has reported a case of root sciatica the symptoms of which for a period of eighteen months preceded Pott's disease—an example of the pre-tubercular sciatica previously alluded to in our section on trunk sciatica.

Sex.—Out of twenty-eight cases recorded by Lortat-Jacob and Sabaréanu, twenty-five, or 89 per cent., occurred in men; in fifteen the left, and in thirteen the right, limb was affected. As opposed to this, all examples observed by us occurred in women, save one—a soldier—in whom a very severe sciatic neuritis of radicular topography supervened as a result of a shrapnel wound in the loin.

Clinical Account.

The symptoms may take the form of a neuralgia or a neuritis, the former being characterized by pains and paræsthesiæ, and the latter, in addition, by trophic changes.

Site of Pain.—The pains and sensory perversions noted by us in both the neuralgic and neuritic forms were referred usually to the skin over the *back of the thigh and the popliteal region*, and in some instances to that covering the *outer surface of the leg*.

In those examples where the pain and sensory perversions were located over the outer side of the leg, the patients complained coincidently of cramp in the hamstring muscles of the same side.

In regard of this association, it is worthy of note that both the hamstrings and the skin over the outer surface of the leg are innervated from the same segment—the fifth lumbar.

Objective Sensory Changes.

It is round these that the chief interest of these cases centres, and upon which our views as to its *radicular* origin are largely based.

The disorders of sensibility observed were chiefly those of hyperalgesia, hyperæsthesia, hypo-æsthesia, and exceptionally anæsthesia.

These abnormal sensations were usually most noticeable on the *back of the thigh*, and when increased sensibility to pain, or hyperalgesia, was present, it was frequently associated with a decrease in common sensation, or hypo-æsthesia.

But, nevertheless, this remarkable dissociation was not wholly restricted to these regions, for often the skin over the *buttock*, the *upper* and *outer portions of the thigh*, and *the sole of the foot* showed the same alterations.

Thus, in cases where the plantar reflex was sluggish on the affected side, it was observed that the skin of the sole was relatively more sensitive to pain than its fellow.

In other words, there appeared to be an increase in pain sensation and a decrease in common sensation over this sensory area, and this same *dissociation of tactile and painful sensations* was simultaneously noted over the skin of the upper and outer part of the thigh and gluteal region.

Definite and fixed anæsthesia was as a rule only met with over the back of the thigh, but similar sensory perversions, and in one example definite anæsthesia, were present over the *outer surface of the leg*, occupying the greater portion of the fifth lumbar segmental area.

One notable feature of these areas of sensory alteration was the contrast they displayed to those met with in trunk sciatica, both as regards their *distribution* and also their *shape*.

Thus, in the case of the sciatic *trunk* its region of sensory supply, as we know, is sharply *confined to the leg*, not encroaching at any point on the thigh.

As opposed to this, in the particular variety now under consideration the sensory changes *extend beyond the lower segment of the limb, and invade the thigh, or are restricted to this latter region.*

Now, it is obvious that, be their explanation what it may, cases presenting such widespread sensory disturbances cannot be legitimately regarded as examples of simple neuritis of the sciatic *trunk*.

It is significant, therefore, that the objective sensory changes noted by us in these examples of sciatica invariably coincided with the areas innervated by the *first and second sacral, and occasionally the fifth lumbar cord segments* (Head).

Now, of these segments, the two former are responsible for the supply of the skin over the back of the thigh, the popliteal region, and the sole of the foot, and the latter for that covering the outer surface of leg and dorsum of foot.

Again, as regards the *contour* of the anæsthetic areas, this contrasted sharply in the two types.

In *trunk* sciatica the anæsthetic patches were discrete and circumscribed, whereas in the *radicular* variety these were arranged in areas whose long axis ran parallel to that of the limb.

Turning to Lortat-Jacob and Sabaréanu's work, we note that they also lay great stress on the fact that in radicular sciatica the sensory changes develop not only on the foot and leg, but also on the thigh.

According to these observers, the roots most frequently involved are the *fifth lumbar*, together with the *first and second*

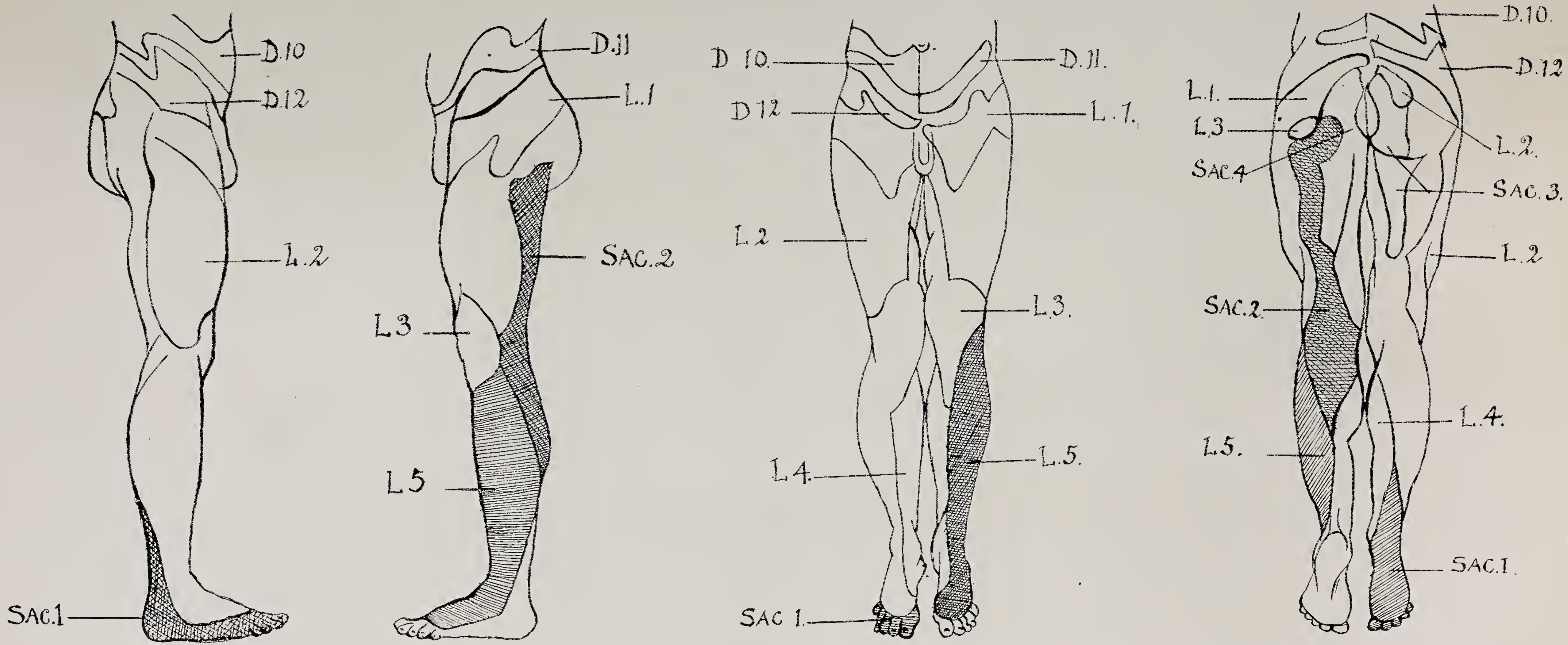


Fig. 74.—Shaded areas indicate the region in which objective sensory changes were found by the authors in radicular sciatica.

To face page 354.

sacral, while much more rarely the fourth lumbar and exceptionally the first, second, and third lumbar, and third sacral roots are implicated.

The sensory alterations observed by them were chiefly hyper- and hypo-æsthesia, rarely anæsthesia. Frequently they found anæsthesia and hypo-æsthesia associated, and exceptionally all three varieties were present in the same limb.

Before leaving these objective sensory changes, it seems advisable to allude briefly to the more crucial distinctions between the various types of cutaneous sensibility which have been elaborated by Head and Sherren.

Cutaneous sensibility, as they elicited, is conveyed by different sets of sensory nerve fibres, designated the "protopathic" and "epicritic" systems respectively.

The *protopathic* constitutes the avenue along which sensations of pain and also those of extreme heat and cold are conducted. On the other hand, it is by the fibres of the *epicritic* system that we are able to appreciate light touches, lesser differences of temperature, and also the power of discrimination between two points of contact as estimated by a pair of compasses.

A sharp distinction must be drawn between these varieties of *cutaneous* sensibility and what is known as *deep* sensibility. The fibres in the last-named are those which conduct sense-impressions and pain-sensations produced by excessive pressure, and the nerves conveying them are those linked up, not with the cutaneous surface, but with the *muscles*, *tendons*, and *joints*.

Now, Head and Sherren were led to believe that, following division (disease) of the *posterior roots*, there ensued an abolition of pain sensation, or analgesia, as well as tactile sensation, or anæsthesia, but the extent of the area in the case of the former was greater and more clearly defined than in the latter.

These findings were exactly reversed in examples where the *peripheral nerves* were divided, as in this instance the epicritic sensation was abolished over a greater area than the protopathic.

Now, in attempting to apply these experimental findings to the clinical features of root sciatica, it does not appear to us that an exact parallel can be established. But, of course, there is a marked difference between *division or gross disease* of a nerve root and *mere irritation* of its fibres, perhaps fleeting, by a microbe or toxin, and it is scarcely to be doubted that the disparity between the clinical phenomena noted by ourselves and those distinctive of severe lesions is thereby possibly explained.

In concurrence with Head and Sherren's results, *total anæsthesia to tactile and painful sensations* has been met with in isolated instances; but in the majority the only sensory aberrations noted were *hyperalgesia*, *hyperæsthesia*, and *hypo-æsthesia*, and this over cutaneous districts related to *root* areas, and presumably representing grades of sensory disturbance correlated with varying degrees of toxicity on the part of the blood-plasma.

Muscular System.

In this sphere, also, a striking difference obtains in this *radicular* variety as opposed to the *trunk* type of sciatica.

Thus, we have frequently noted wasting to be present in muscles *unrelated to the great sciatic nerve.* For, apart from atrophy in the muscles of the leg, a similar change is often present in those of the buttock.

Now, the gluteal muscles are supplied, not by the sciatic, but by the *superior and inferior gluteal* nerves. Segmentally, however, the gluteal are associated with the peroneal and anterior tibial muscles, all of which, according to Head, are governed by the same segments—the *first and second sacral.*

Lortat-Jacob noted the presence of muscular atrophy in 53·5 per cent. of his cases, and, like the accompanying sensory troubles, it was clearly of *radicular* topography.

It is interesting also to note that *subcutaneous adiposity* was detected by this observer in five out of twenty-eight cases.

Superficial and Deep Reflexes.

Superficial.—The most striking fact noted by us in regard to these was the remarkable harmony that obtained between the gluteal and plantar reactions. If the plantar were sluggish in response, the gluteal reaction on the same side was likewise tardy, and the reverse held good; while the opposite and unaffected limb gave normal reactions.

On the other hand, the *cremasteric* reflex was as a rule exaggerated, the difference between the two sides being often strikingly obvious.

Independently, the late Professor Gibson of Edinburgh had emphasized this peculiar behaviour of the superficial reflexes, not only in cases of *sciatic neuritis*, as evidenced by wasting and disturbed electrical reactions, but also in *sciatic neuralgias.*

He laid stress on the constancy with which the cremasteric reflex was exaggerated, and we can confirm him in that this reaction is more easily elicited by firm pressure over the inner and lower portion of Scarpa's triangle than by the usual stroking of the skin on the inner side of the thigh.

He also observed that in some, while all three superficial reflexes might be simultaneously exaggerated, in others, while

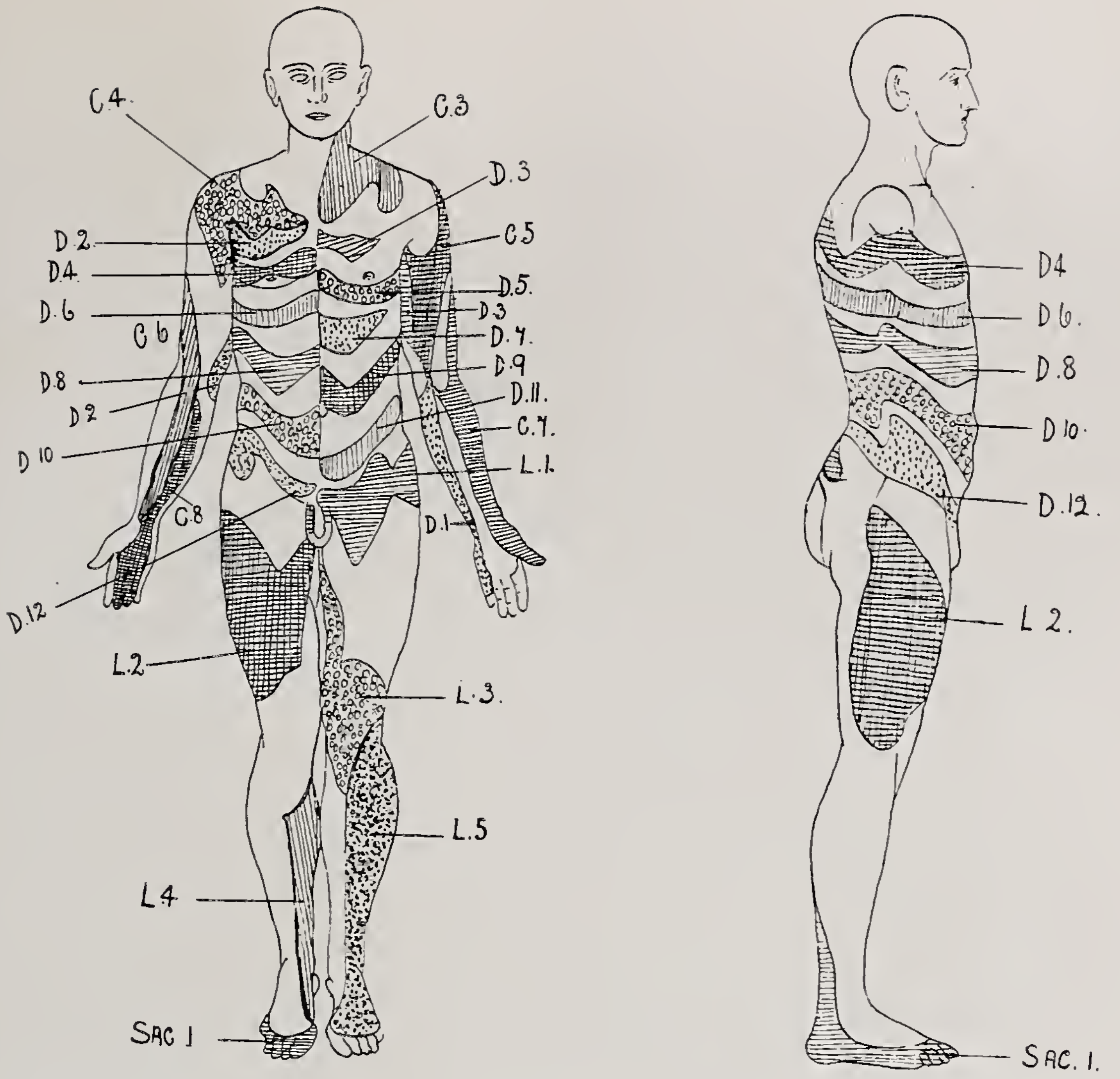


FIG. 75.—These show the distribution of the segmental areas from the third cervical to the fourth sacral zone. (Head.)

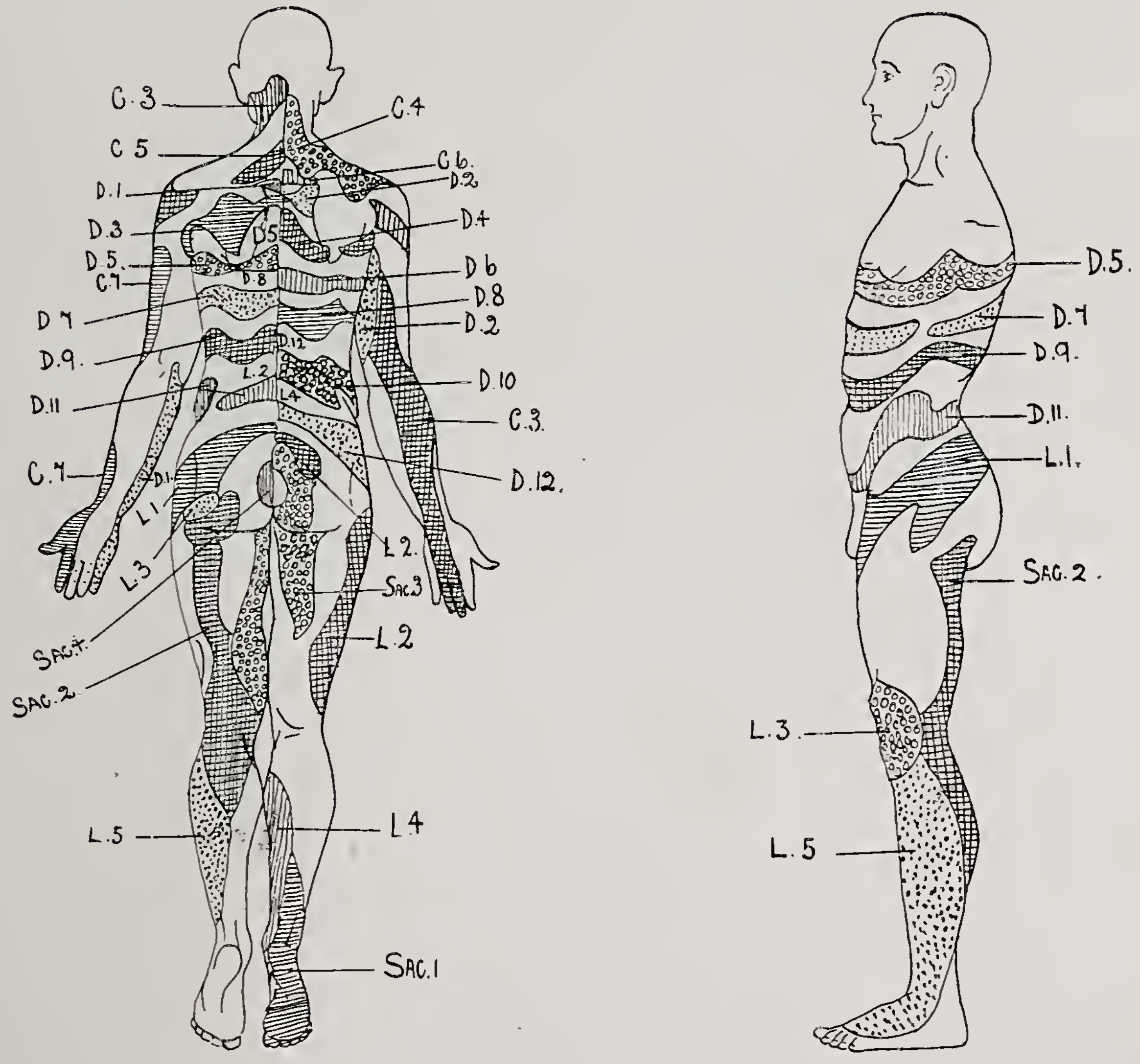


FIG. 76.—Areas, back and side. (Head.)

To face page 356.

the cremasteric reaction was unduly brisk, the plantar and gluteal were scarcely to be evoked.

Gibson also drew attention to an interesting analogy between the behaviour of the deep and superficial reflexes. Thus, the plantar and gluteal are not so uniformly heightened as the cremasteric, and in the same way the ankle-jerk is much less often increased than the knee-jerk.

Discussing the significance of these findings, he points out that the spinal centres of the cremasteric and knee reflexes are situated at a higher level than the central connection of the sciatic nerve trunk.

He suggests, therefore, that "in sciatica the segments of the cord at and below the sciatic connections have but little tendency to exaggeration, while those above are in a state of exaltation."

To our mind, however, the constancy with which the cremasteric reflex is exaggerated, though very striking, is less suggestive than the *sympathetic response of the gluteal and plantar reflexes.*

For while the cremasteric, on the one hand, is governed by the *second lumbar* segment, the gluteal and plantar reflexes, on the other, own allegiance to the *first and second sacral* (Head).

It is, therefore, significant that the *objective sensory changes* as well as the *muscular atrophies* noted by us in this type of sciatica were invariably located in those particular skin areas and muscles governed by these same sacral segments.

Lortat-Jacob and Sabaréanu in their series found the reflex reactions were almost always modified, but, as far as we have been able to ascertain, they have not observed the harmonious correlation of the gluteal and plantar reactions.

As regards the *deep reflexes*, the ankle-jerk they noted was diminished in 42·3 per cent., exaggerated in 23·1 per cent., abolished in 15·4 per cent., and normal in 19·2 per cent.

As regards the patellar reflex, it was found to be diminished in 35·7 per cent., exaggerated in 32·1 per cent., abolished in 3·7 per cent., and normal in 28·5 per cent.

According to these same observers, Lasègue's sign was usually to be elicited, but Valleix's points were more often than otherwise incomplete, and it may be mentioned that Camus and others have noted their complete absence.

Lortat-Jacob and Sabaréanu state that *tender points* are most obvious in cases where the *fifth lumbar* and the *first three sacral roots* are implicated. But on the other hand, in those instances in which the third sacral was unaffected, the points of Valleix were incomplete.

Some observers, more particularly Sicard, attached diagnostic significance to the fact that in root sciaticas the performance of the physiological act of *coughing* produces great pain.

Lortat-Jacob and Sabaréanu state, however, that it is uncertain, but its presence has been noted by Berthéol, Rousselier, Camus, and Sézary.

We have in a previous section alluded to *homologous scoliosis* as a special feature of root sciatica, Lortat-Jacob having observed it in thirteen out of twenty-eight cases.

Of additional features, Lortat-Jacob and Sabaréanu in very exceptional instances have noted the presence of Kernig's sign, pupillary inequality, and foot clonus.

Lastly, in cases of syphilitic origin, the tendency to relapse, even after years have passed, is emphasized by these workers.

Summary of Clinical Phenomena.

The salient features of this type of sciatica would appear to be as follows:

1. The sensory troubles, both subjective and objective, unlike trunk sciatica, are found *not only in the foot and leg, but also in the thigh.*
2. The areas of disordered sensation are arranged in *bands running parallel to the long axis of the limb*, and not in localized circumscribed patches as in trunk sciatica.
3. The roots most frequently attacked are the *fifth lumbar*, and the *first and second sacral.*
4. Muscular wasting, like the sensory changes, is of *radicular* disposition.
5. The gluteal and plantar reflexes undergo simultaneous diminution or exaggeration, but the cremasteric is usually exaggerated; while of the deep reflexes the *ankle-jerk* is most commonly diminished, and more rarely the patellar.

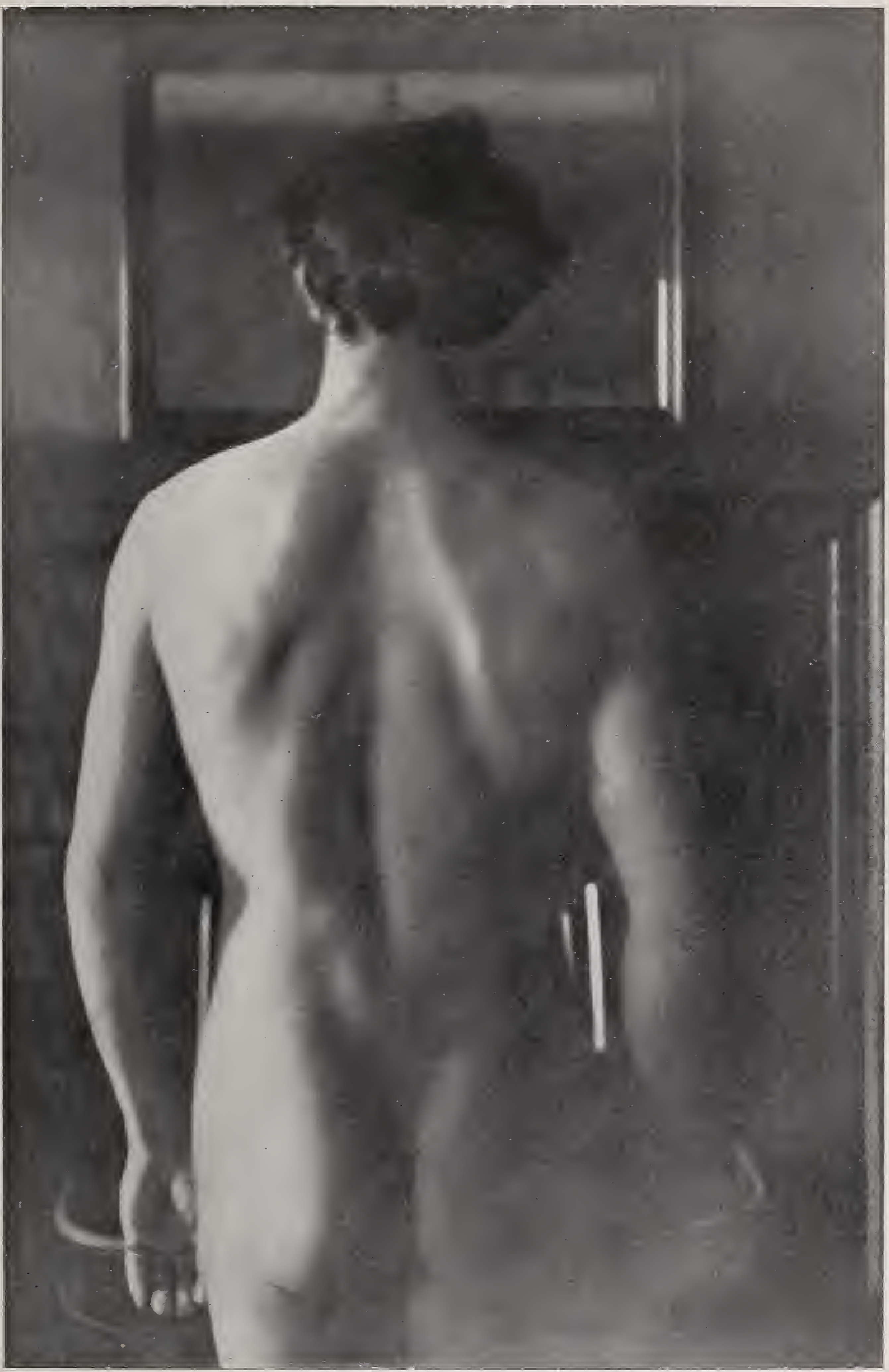


Fig. 77.—Right-sided sciatica of radicular type. Note homologous scoliosis (most frequent in this type)—viz., concavity of curvature faces affected limb. This subject has also slight forward inclination of trunk—viz., kypho-scoliosis.

CHAPTER XXVIII

SCIATICA: DIAGNOSIS

Sciatica is not a disease, but a symptom, and the overlooking of this fact is responsible for many errors.

Its diagnosis should never be precipitately determined, inasmuch as it is not the mere recognition of sciatic pain which is at stake, but the more difficult and infinitely more important question—*the establishment of its cause.*

Happy is the man, and surely lacking in large experience, who has not at one time or other had to repent of a too hasty diagnosis of simple sciatica.

The long extended course of the nerve, as it runs from the cord through the pelvis to the very extremity of the limb, exposes it to multiple contingencies; hence the numerous pitfalls into which the unwary often, and even the prudent occasionally, fall.

In approaching, therefore, any given case, we should in the first instance satisfy ourselves as to the actual nature of the condition before us—whether it is what it appears to be, an affection of the sciatic nerve.

Topographical Diagnosis.

Site of Pain.—The patient being stripped, we should request him to indicate the path of the pain, carefully noting whether it is accurately localized to the *trunk* or one or other of its peripheral branches.

The chief sources of fallacy at this juncture are the confusion of sciatica with the pains of *hip-joint disease* and *gluteal fibrositis.* The pain in sciatica *radiates down along the trunk,* and in the case of neuritis is associated with tenderness of the same to pressure.

In *hip disease* the pain is circumscribed, and referred more to the hip and knee joints and to the *front* of the thigh; it does not follow the course of the nerve, which is devoid of tenderness.

In *gluteal fibrositis* the spontaneous pain and local sensitiveness are often restricted to some definite circumscribed area, the site of a nodule or infiltration. If more diffuse, it corresponds to the position of the *implicated muscle or aponeurosis*, and not to the course of the sciatic nerve.

It does not usually occur in paroxysms, but is aggravated and evoked by contraction of the affected muscle. The sciatic nerve is neither painful nor tender, unless a nodule abuts on it or an actual extension of the morbid process to the sheath has taken place.

Simultaneous Anterior Crural and Sciatic Pains.—Coincident pains along the front as well as the back of the thigh obviously remove the case beyond the pale of simple sciatica, and point to the presence of some morbid process irritating both lumbar and sacral plexuses.

Having excluded these possibilities, and arrived at the conclusion that the pain is actually localized in the sciatic nerve, we have now to decide this question:

Is the Pain due to Neuralgia or Neuritis?

Sciatic Neuralgia is characterized by the following peculiarities:

1. Suddenness of onset.
2. The pain is *spontaneous*, and is referred to the area of distribution of the sciatic nerve rather than to the trunk.
3. The pain is *periodic* and intermittent in its incidence, with intervals of complete repose.
4. Movement of the limb is not necessarily painful, though it may excite a paroxysm of pain.
5. Nerve tenderness is absent, or only slight and fleeting.
6. Muscular atrophy, electrical changes, and anæsthetic areas are wanting.

Sciatic Neuritis will be betokened by the following features:

1. Gradual and insidious onset.
2. The pain is *spontaneous* only in the later stages, and is referred to the trunk.
3. The pain is *constant*, with no complete remission.
4. Movement of the limb infallibly aggravates the pain.
5. Tenderness of nerve trunk is present and is persistent.
6. In severe cases *muscular atrophy, altered electrical reactions, anœsthetic areas, and trophic phenomena* are present, as well as *diminution or abolition of tendo Achillis jerk.*

Having effected this discrimination, the next point to assure ourselves of is the following:

Is the Sciatica Primary or Secondary?

To a limited extent our decision on this point will be aided by an analysis of the distribution of the pain, and its association or not with tenderness of the nerve trunk to compression or extension.

Primary Sciatica is marked by the following features:

1. Strict localization of pain to the *nerve trunk.*
2. Persistent tenderness to pressure.
3. Pain aggravated by Lasègue's method of extension.
4. Onset of sciatic pain often preceded by lumbar or gluteal pain, often of months' standing.

Secondary Sciatica displays the following contrasts:

1. Pain commonly referred to the *area of distribution.*
2. Nerve tenderness is absent or slight in proportion to the pain.
3. Extension by Lasègue's method does not infallibly aggravate the pain, which instead may be relieved by this manœuvre.
4. Other symptoms, varying according to the nature of the *primary* disorder, are often present.

Of the foregoing distinctions, those based upon the *topographical* distribution of the pain, though not absolute, are yet very helpful as indications of the primary or secondary nature of the disorder.

Secondary sciatic pain is usually, though not invariably, of *neuralgic* nature, and often it is felt on the *outer side of the calf,* with simultaneous paræsthesiæ on the external half of the dorsum of the foot.

To sum up, a sciatica of partial or *peripheral* topography is more likely to be secondary than one of *trunk* distribution.

We have now dealt with the topographical differentiation of primary and secondary types of trunk sciatica, whether of neuralgic or neuritic character.

Presuming, however, that the case under consideration does not fall within this category, and yet is characterized by pain over the sciatic area, we have now to determine this further point:

Is the Sciatica of Trunk or Radicular Type?

This differentiation will depend entirely on—

1. The distribution and contour of the objective sensory changes.
2. The anatomical disposition of the muscular atrophy.

In respect of these points, the following are characteristic of *Trunk Sciatica :*

1. The sensory changes are rigidly *restricted to the leg* and do not invade the thigh.
2. The anæsthetic areas are small, patchy, and *circumscribed.*
3. They are situated on the outer half of anterior and posterior surfaces of leg and on the foot, save over its inner margin and that of the great toe.

As opposed to the foregoing, the following are in favour of *Root Sciatica :*

1. The sensory changes involve *thigh and leg*, or thigh alone, and not infrequently are more widespread, involving the *buttock.*
2. The anæsthetic areas are arranged in *bands* running parallel to the long axis of the limb.
3. They occupy most frequently the *fifth lumbar, first and second sacral*, and more rarely the fourth lumbar areas.
4. Muscular atrophy is not limited to the area of supply of sciatic trunk, but affects the *gluteal* and other muscles in accordance with the particular roots involved.

We have now differentiated the trunk and radicular types of unilateral sciatica, and have in conclusion to deal with their bilateral manifestations.

Bilateral Sciatica.

This, like the unilateral, may be of *trunk* or *radicular* topography, and in either case the occurrence of such symmetrical sciatic pains should invariably suggest the *secondary* nature of the affection, true bilateral sciatica being practically unknown.

To avoid reiteration, we would refer the reader to the features of secondary sciatica of trunk distribution, the only difference being the *symmetrical* character of the manifestations.

In the case of the radicular variety, the distribution of the objective sensory changes and the muscular atrophy in both limbs will infallibly point to some central disease, involving the roots near their origin, such as disease of the meninges, the spinal column, cauda equina, or the spinal cord itself.

Having arrived at this stage of our diagnosis, we can now proceed to establish as far as possible the exact nature of the underlying cause.

Etiological Diagnosis.

This is of course of prime importance, and entails a careful examination of every individual case from all its aspects.

Primary Sciatica.

Presuming it to be of this variety, we have to determine whether any metabolic disorder, notably *gout*, has any share in its production. The ancestral and personal history will often supply indications of such an origin, and the presence of tophi or the occurrence of previous arthritic outbreaks will confirm our suspicions.

Or it may happen that the individual tells of a previous attack of acute rheumatism, often very remote, and more pertinently of recent recurring bouts of so-called "muscular rheumatism," and these, moreover, very responsive to weather changes.

If so, we may provisionally deem it of "rheumatic," or more correctly of infective or toxic, nature, this of course predicating a search for some *local source of infection or toxic absorption*, oral, gastro-intestinal, etc., wherewith to clinch our views as to its pathogeny.

Again, is the person passing excessive quantities of urine, sinking in weight despite voracious appetite, and given to neuralgias elsewhere ? Then the possibility of *diabetes* must be entertained, especially if the sciatic pain is bilateral.

Remissions and exacerbations following the diminution or increase of glycosuria will clinch the diagnosis.

Nor must we overlook as possible etiological factors the various infections, influenza, malaria, *gonorrhœa*, not to mention syphilis and tubercle.

As regards *influenza*, there is no doubt that many cases of sciatica arise in sequence to this infection; and in some it is of *bilateral* distribution, but it may be added that in many instances the so-called "influenza" is nothing more than a febrile attack associated with gastro-intestinal disturbance.

In persons who have perhaps resided in foreign climes a *malarial* infection may be responsible, and any marked tendency to periodicity will be suggestive of a possible paludal origin.

Where the sciatica arises during the course of an acute *gonococcal* urethritis, and declines with the successful treatment of such, we may be justified in attributing it to the primary disorder.

But apart from this, when a *chronic gleet* exists, the possibility of its causal relationship should not be overlooked, and the most cogent proof of their interdependence will be the favourable response of the sciatic pain to special treatment of the urethral infection.

It is important also to remember that, though a cause of trunk sciatica, according to Lortat-Jacob, it is in the *root* variety a pre-eminent etiological factor.

The possibility of a *syphilitic* origin should always be held in mind, as according to some authorities it is one of the most frequent causes of sciatic pain, and particularly of the radicular type.

Consequently we should in all cases of sciatica be alive to the significance of specific lesions, such as *cicatrices of chancres*, or *gummata*, also *buccal leukoplakia* or *palatal and bony deformities.*

The absence of such does not exclude the possibility of a syphilitic etiology, for sciatic pain may be the isolated expression of such infection.

There is nothing distinctive of syphilitic as opposed to sciaticas of dissimilar causation, yet the occurrence of pains only during the night or their marked exacerbation at this time is suggestive.

But far more indicative of a specific origin is a *root* distribution of the sensory disorders, and these present only in *one* limb.

Finally, in doubtful cases we shall have to rely for our diagnosis upon a *positive Wassermann reaction*, and the results, favourable or otherwise, of vigorous *antispecific treatment.*

In addition to the foregoing means of differentiation, in root sciatica the results of *lumbar puncture* may be helpful, Lortat-Jacob maintaining that in root sciaticas the fluid is rich in lymphocytes and of high tension.

In the *tuberculous* and the pre-tuberculous types of sciatica, so emphasized by the French authors, our diagnosis could only be established by the nature of the reactions to hypodermic injections of tuberculin and other methods of ascertaining the presence of this taint.

Lastly, while it is of the utmost importance that we should, if possible, attain to an exact etiological diagnosis, still the fact remains that in very many, if not the majority, of examples of sciatic pain the exact causation is undeterminable.

In such event we have to consider the general condition of the patient with regard to *anæmia*, *digestive troubles*, and *constipation*, to which many cases of sciatic neuralgia, especially in women, are to be attributed.

The success that follows the treatment of these various departures from normal leaves one in little doubt that the fundamental cause in very many of these cases is a state of *subinfection*, or, as some would term it, auto-intoxication.

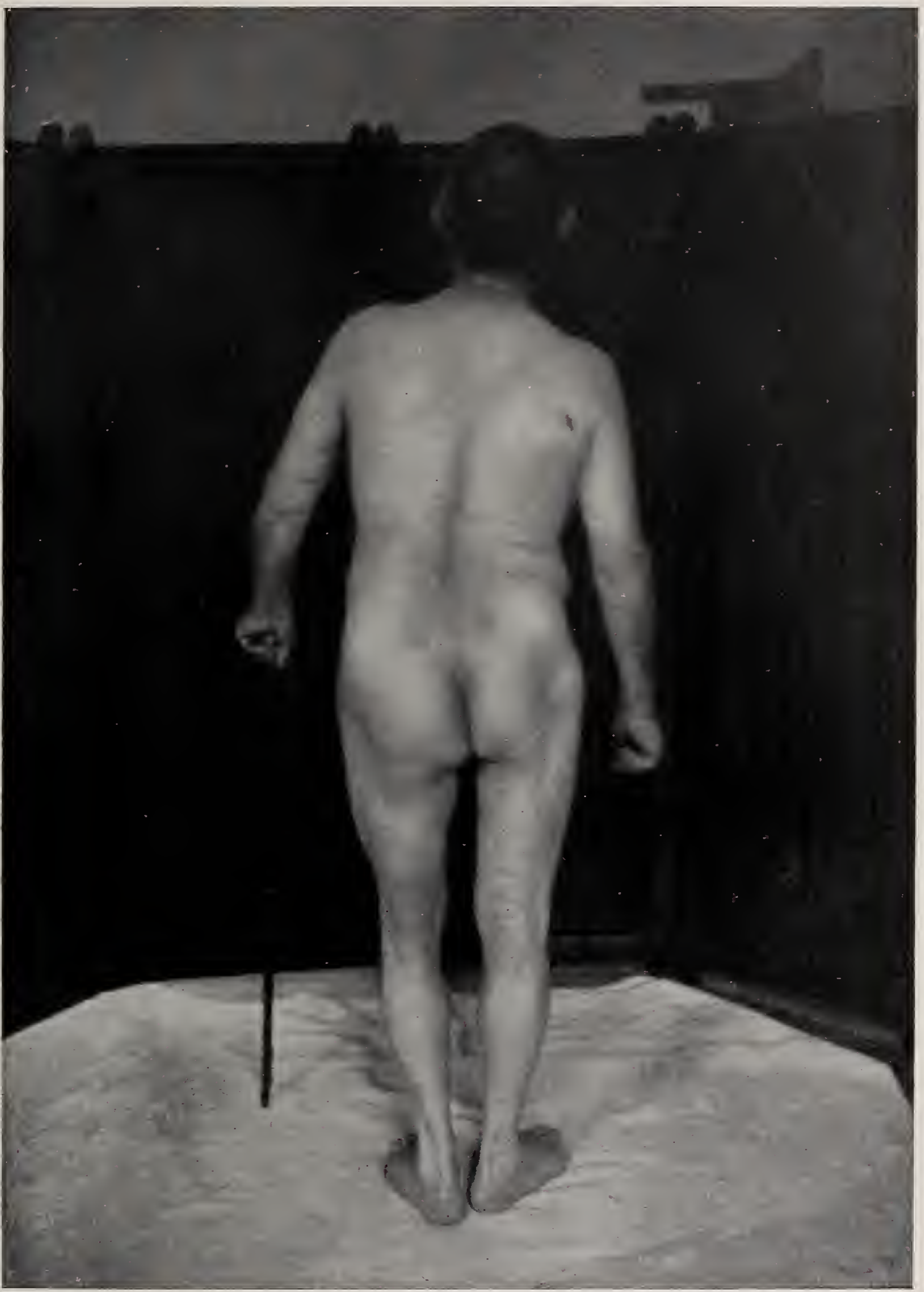


FIG. 78.—Osteo-arthritis of right hip-joint, showing atrophy of glutei on right side, also scoliosis.

Secondary Sciatica.

The failure to recognize the true nature of these symptomatic sciaticas is often attended by irreparable consequences.

A routine *rectal* and *vaginal* examination in the subjects of this affection would do much to obviate the perpetration of the graver diagnostic errors.

Only in this way can we determine the presence or absence of *anal fissure*, *internal piles*, or *rectal ulcer*, or the graver causes of secondary sciatica, such as *intrapelvic growths*, uterine or rectal, also enlarged prostate, sacral tumours, and so forth.

The examination of the abdomen, too, should not be neglected, as otherwise *pregnancy*, or even graver conditions, such as an *aneurysm*, may be overlooked. While sciatica may arise during the early months of gestation, it more commonly arises after a difficult or instrumental labour, and is generally *peroneal* in distribution.

Here one would note also the occurrence of right sciatic pain in cases of *appendicitis*. Recently such a case came under the care of a colleague of one of us, Dr. Munro, and in this case the removal of the appendix was followed by disappearance of the sciatic pain.

In women the account of a previous operation on the breast or elsewhere should warn us that a *secondary malignant deposit* may be responsible.

Nor should we omit to investigate *the hip-joint*, as well as the *lumbar column*, for any restriction of movement or fixation, at the same time noting any abnormal physical signs, such as swelling or deformity in these regions, because of their possible relationship to the affection.

Examination of the *deep reflexes* and *pupillary reactions* should always be undertaken, as otherwise in bilateral forms grave central disease may be overlooked, or the condition confused with one of the infective or toxic forms of polyneuritis.

In conclusion, the belated recognition of the *secondary* nature of a sciatica places the physician in a most unenviable position —none more so. Fortunate indeed are we if under such compromising circumstances the inevitable disillusionment comes at one's own hand, and not through another's.

At best, hampered by the consciousness of a too hasty decision, it is not easy to rehabilitate onself in the esteem of the patient, who, resting on the assurance that he is only suffering from sciatica, is now called upon to face the grim reality that he is instead the victim of a *malignant growth*, *tabes dorsalis*, or some other grave disorder, of which his sciatic pain has been, so to speak, only the clinical outpost. The only way to insure our escape from such unpleasant experiences is to realize that sciatica is but a *symptom*, and not a disease, and that its diagnosis can be considered in no way complete until we have as far as possible established its cause.

Differential Diagnosis.

Osteo-Arthritis of the Hip-Joint.

Etiology.—The subjects of this disorder are usually males of forty years of age and upwards. There is often a history of direct or indirect trauma.

Pain.—This may be of two kinds—*local* and *referred*. The former is deep-seated, either in the groin or behind the great trochanter. At first intermittent and periodic, it becomes later more constant, and is associated with capsular tenderness. The latter, which are very typical of this disorder, consist of *coincident* pains along the course of the sciatic and anterior crural or obturator nerves.

Disorders of Mobility.—Slight hip flexion with compensatory lordosis is present, also limitation of extension, flexion, inward rotation, and abduction, with eversion of the foot and leg. All the foregoing signs, moreover, may be present *before exostoses are detectable by skiagraphy*.

In the *terminal* stages of osteo-arthritis the following are to be observed: Real shortening from absorption; wasting of the gluteal and thigh muscles; grating on movement; and a prominent and enlarged trochanter.

So commonly is this disorder confounded with *primary sciatica* that we would draw attention to the following points:

Local pain and tenderness in the groin and trochanteric region are absent in sciatica, in which the pain is strictly limited to the nerve trunk.

Passive flexion of thigh with extension of leg is painful and restricted in sciatica, but all other movements are usually painless.

General limitation of mobility is distinctive of osteo-arthritis, and particularly *limitation* of *abduction*, which movement, however, is free and painless in sciatica.

Wasting of the buttock, when present, is suggestive of osteo-arthritis, atrophy of the glutei being absent in sciatica, as these muscles owe their supply to the inferior gluteal nerve.

Radiography in all doubtful cases is essential to establish a diagnosis.

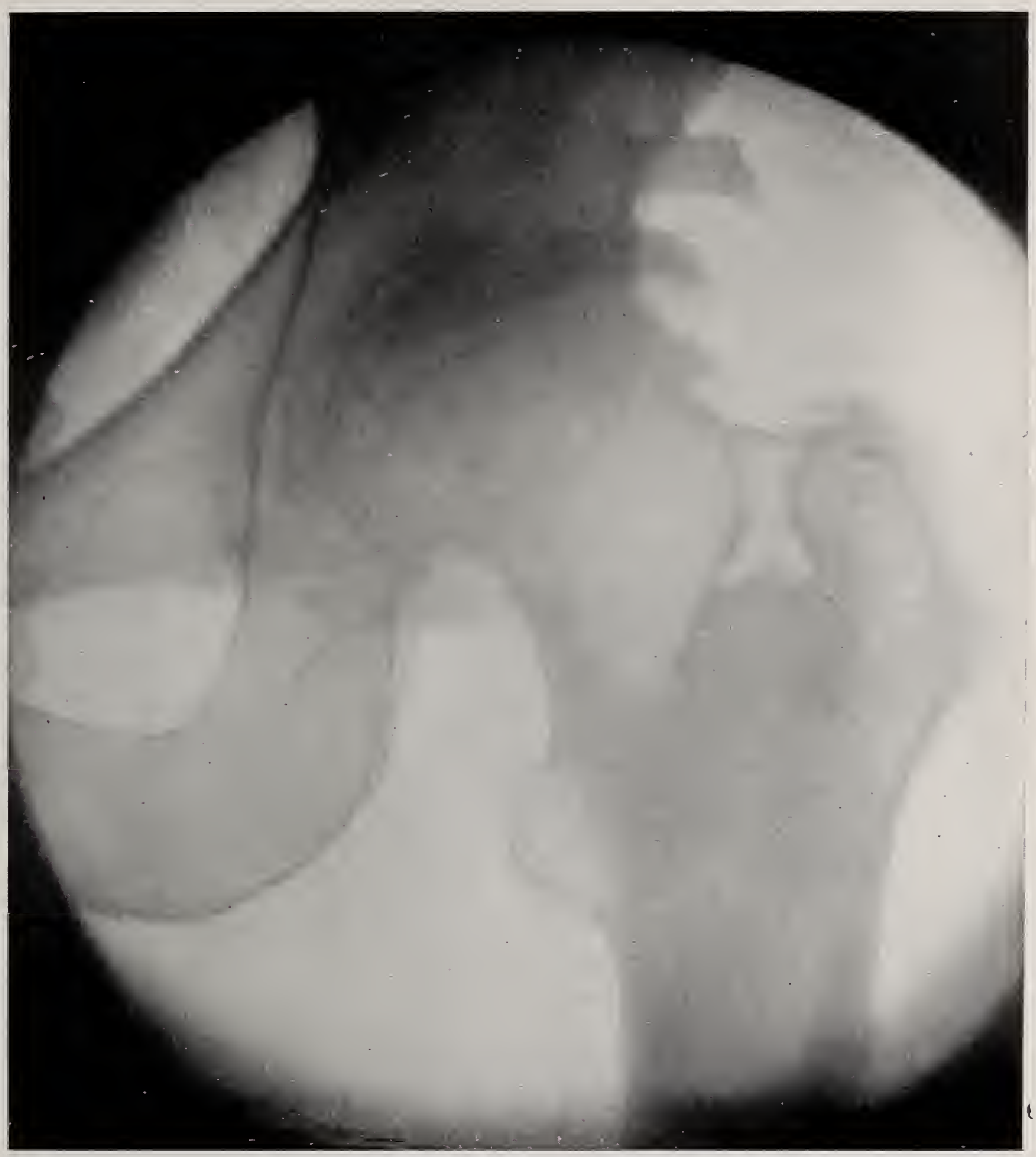


FIG. 79.—Skiagram of osteo-arthritis of hip. It shows large exostoses projecting from superior rim of acetabulum.

To face page 366.

Tuberculous Disease of the Hip-Joint.

The subjects of this disorder are usually under twenty years of age, a period of life when sciatica is rare. The general health is often below par, and there are not infrequently signs of tubercle elsewhere. Pain is not referred to the sciatic nerve, but to the hip and knee joints.

Fulness and swelling of the joint are present, with tenderness on manipulation, especially to pressure over the trochanter.

Unlike sciatica, *hyperextension or extreme abduction* causes pain. In the early stage of tuberculous disease the limb is abducted, everted, and flexed at both hip and knee, with apparent lengthening; while in sciatica the limb is flexed at the knee-joint, and the trunk bent forward.

Lastly, inasmuch as sciatic pain may be associated with tuberculous disease, in doubtful cases skiagraphy should be appealed to.

Tuberculous Disease of the Sacro-Iliac Joint.

The subjects are usually young adults with a family history of tubercle or who present lesions of this nature elsewhere.

In one of our own cases, a young man aged thirty-two, tuberculous sinuses over the lower jaw had existed for some twelve months previous to the onset of sciatic pain in the lower limb.

In another instance, a girl aged twenty-two, the subject had been treated for some weeks as a case of simple sciatica. The detection of a *nightly rise of temperature* led to a revision of the diagnosis. Soon after swelling appeared over the right sacro-iliac joint, with local pain and tenderness to pressure, the former greatly aggravated by attempts at approximation or separation of the wings of the ilia.

The correctness of the diagnosis was afterwards confirmed by skiagraphy and later by the formation of abscesses.

In the early stages diagnosis may be by no means easy, but attention to the following points will help in the avoidance of error:

Pain at first is felt in the *sacral* region, and though, as in the foregoing case, it may radiate as far as the popliteal region, as a rule it does not extend even as far as the upper part of the thigh.

Tenderness is present over the *synchondrosis*, but is either absent over the course of the sciatic nerve or quite subordinate in intensity to the radiating pains.

Lateral pressure on the iliac crest greatly aggravates the pain in the joint. Examination of the *rectum* may, as in the case first cited, reveal tenderness, œdema, or a sense of fluctuation.

Strain or Relaxation of the Sacro-Iliac Ligaments.

This in our experience is a very fertile cause of confusion, and most of these cases pass as being examples of primary sciatica. This, we think, is due very largely to the fact that it is not sufficiently recognized that, apart from pregnancy and severe injury, variable degrees of relaxation may ensue in sequence to *static deformities in the lower limb*, and the *maintenance of strained postures* incidental to certain occupations. The points to lay stress on are local pain usually over only *one* synchondrosis, and often referred along the sciatic and obturator nerves. The pain is increased by straight-leg flexion, this being due to spasm of the hamstrings and consequent secondary traction on the sacro-iliac joint. All movements are painless if the pelvic girdle be effectually fixed.

For further details on this very important and frequent cause of sciatic pain, we would refer the reader to a coming section.

Subgluteal Bursitis.

The site of the lesion is the bursa lying between the gluteus maximus and trochanter. Exclusive of syphilitic and tuberculous infections, *gout* and *trauma* are the most common causes of inflammatory enlargement of this sac.

The symptoms are pain, local, and referred along the sciatic nerve. It is intensified by extension and abduction, but *diminished or abolished if the thigh be flexed and adducted.*

The local signs are swelling over and behind great trochanter, obliterating the usual hollow, and in addition such may be lobulated and very diffuse. In long-standing cases the swelling is hard and indurated, while the neighbouring muscles are somewhat rigid. Exquisite sensitiveness to pressure is present, as well as secondary pain along the sciatic nerve.

Lumbar Spondylitis.

Pain, stiffness, and fixation of one or more spinal segments will be a prominent feature. Tenderness to pressure of the affected vertebræ is of uncertain value, as Gara has shown that such may be present in sciatica of radicular type.

Irregularity in the spinous processes or any tendency to *lumbar kyphosis* would point strongly to spondylitis, and if of *tuberculous* nature the presence also of other symptoms should suffice to determine the diagnosis

In *lumbar osteo-arthritis* exostoses may be felt by palpation of the posterior surface of these segments and of the sacrum.

Possibly, too, by rectal or vaginal examination they may be detected on the anterior surface of the latter. These cases often present the greatest difficulty, and *skiagraphy* alone can decide the presence or absence of osteophytes impinging on the nerve roots as they pass through the foramina.

Malignant Disease of the Femur.

Careful examination of the limb should prevent one confounding this condition with sciatica, but occasionally this regrettable error is fallen into.

A striking example of this confusion of sciatic pain with a tumour of the thigh-bone recently came under our observation.

The subject, a lady of forty-five, had suffered for some six months with pain in the left thigh. During this period she consulted two physicians, each of whom independently arrived at the conclusion that she was suffering from sciatica. On seeing the patient, one's attention was arrested by her general emaciation.

Local examination elicited the fact that the pain for the most part was situated in the *front of the thigh*, and further questioning revealed that at no time had it followed the course of the sciatic trunk. Palpation showed that the middle third of the femur was the seat of a swelling of bony hardness shading off at either end into the shaft of the femur.

Skiagraphy confirmed this impression, and an exploratory incision being deemed necessary, it was performed by Mr. Crisp English, when a portion of the growth was excised for microscopic examination.

Its sarcomatous nature being ascertained, the limb was successfully disarticulated at the hip-joint shortly afterwards.

We have known a similar error in regard to a malignant growth in the tibia. The subject in this case was an aged medical man, who unhappily contended until too late that it was of gouty nature.

Syphilitic Periostitis.

This disorder, when situated in the shaft of the femur, is sometimes confused with sciatica, but the local signs, taken together with a history of infection, and possibly evidences of syphilis elsewhere, should suffice to prevent error.

Thrombosis of the Femoral Vein.

One of the chief factors in the diagnosis of this condition is the previous history. Thus, in the case of a woman, a history of recent childbirth might be elicited, or in either sex the presence of *tubercle or cancer* giving rise to a cachectic state, might be found. *Influenza* is a common cause.

Local symptoms comprise pain generalized over the limb, usually severe and paroxysmal in character, œdema of the whole limb, either soft or brawny in nature.

Localized tenderness may be present, especially in the groin, popliteal space, and calf. In the latter situation it is often first noted.

Dilatation of the veins is marked, and in some cases the thrombosed vein may be felt as a firm, hard cord. Pyrexia is usually slight, except in septic cases.

In sciatica the foregoing symptoms, with the exception of pain and tenderness, which are referred to the line of the sciatic trunk, are absent.

Lightning Pains of Tabes.

Only in the *pre-ataxic* stage is confusion likely to arise. The pains are usually *bilateral*, irregular in incidence, and fugitive in character, and may be felt in other parts, such as the trunk or the limbs.

The presence of Argyll-Robertson pupils, with absence of the knee-jerks, will serve to confirm the diagnosis.

As showing the ease with which the pains of tabes may be confused with sciatica, we may cite the following instance:

The subject, an old military man, came to Bath, said to be suffering from right-sided sciatica, with symptoms of bladder trouble ascribed to prostatic enlargement. One day, while turning in bed, the femur on the same side suddenly snapped across the shaft.

This startling occurrence led to a revision of the diagnosis, and the view now taken was that the prostatic enlargement was of malignant nature, and the fracture a consequence of the secondary deposit of growth in the thigh-bone.

Ultimately, however, it was ascertained that the condition was one primarily of *tabes dorsalis*, with lightning pains, bladder crises, and spontaneous fracture.

Intermittent Claudication.

In this condition pains and weakness ensue in the leg after walking for a few minutes. If persisted in, painful cramp compels the patient to stop. After a few minutes' rest all these symptoms disappear, but only to reappear on again attempting to walk. Objectively, coldness and pallor of the limb are occasionally detectable, with diminution of pulse in the anterior tibial artery.

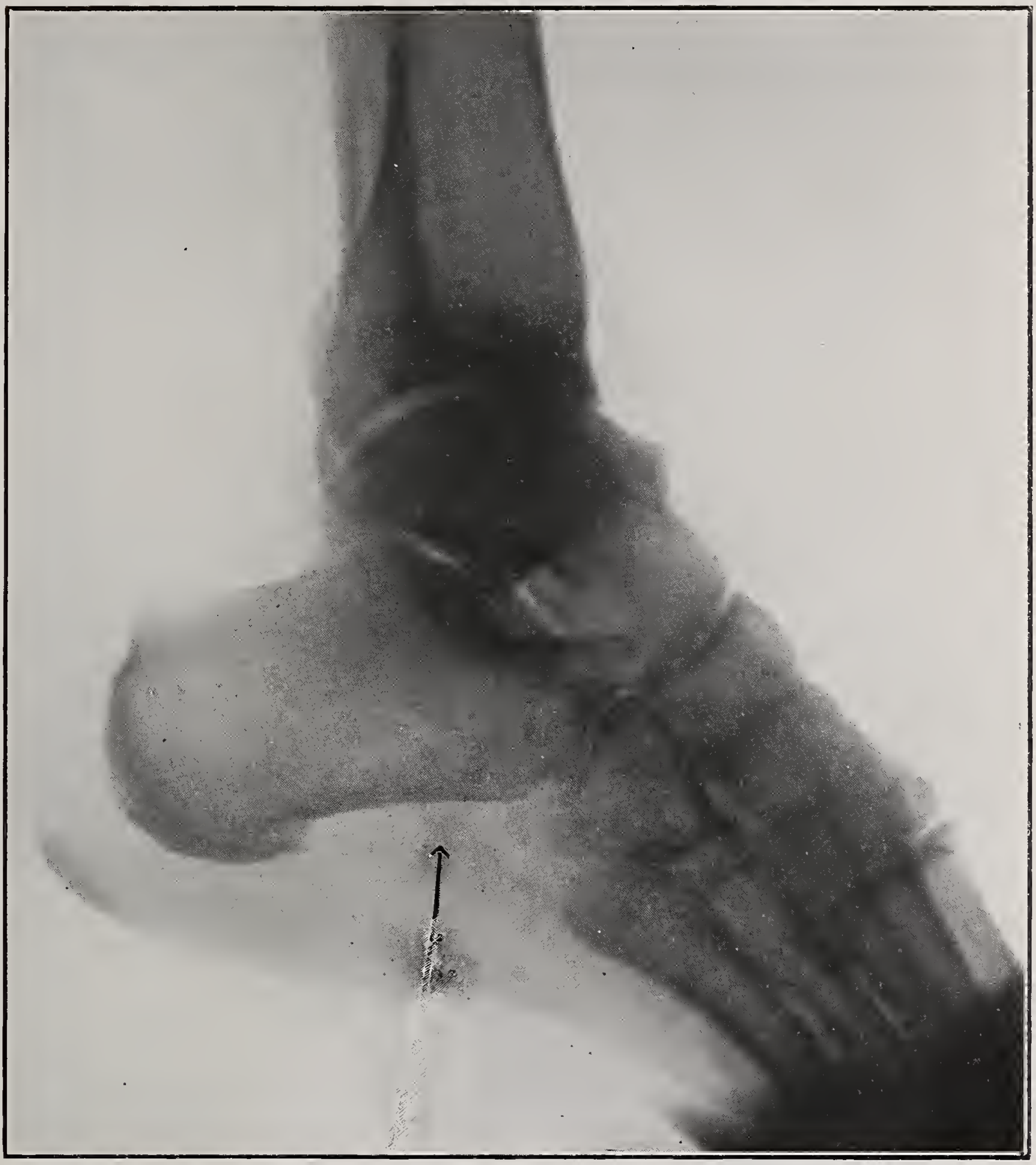


Fig. 80.—Skiagram of right ankle-joint, showing calcification of external plantar artery.

To face page 370.

Recently a case we believe to be of this nature came under our observation. The subject, a prematurely aged man, complained of pain and diminished mobility in the right shoulder, and at the same time of "*rheumatic*" pains in the leg and foot.

The condition of the shoulder was found to be one of *osteoarthritis*, probably due to trauma, but no change could be detected in the affected leg and foot beyond marked *calcification of both tibial and plantar arteries.*

Oppenheim, discussing the differential diagnosis of sciatica, emphasizes this vascular disorder as a source of confusion, but the graphic appearance and disappearance of the symptoms under the influence of exercise and rest and the revelation by skiagraphy of local arterial changes should minimize the chances of such an error.

Sciatic Pain due to Static Deformities.

The frequency with which these secondary pains are confused with sciatica is insufficiently realized. The pain more commonly simulates that of a partial or incomplete type of sciatica, but it may extend up the thigh.

Recently a middle-aged officer consulted one of us for a long-standing pain in the left sciatic region. Fortunately, in the course of the examination his foot was not omitted. The plantar arch was obviously very depressed, and suitable orthopædic measures being undertaken, the sciatic pain disappeared.

Failure to examine the naked foot is chiefly responsible for the errors made in this connection, and as showing the necessity for emphasizing the frequency of this sin of omission we may cite the following instance:

The subject, a man aged thirty-five, had for some eighteen months suffered from vague pains in the sciatic region. During this period he consulted no less than nine medical men, who all regarded his condition as one of simple sciatica. Physical exercises, combined with a mechanical support, were successful in relieving his symptoms, which were due to *marked flat-foot.*

The pseudo-sciatic pains of flat-foot subside or disappear on lying down, only to reappear on standing or walking. If, however, secondary inflammatory changes have taken place in the tarsal joints, the pains are more persistent, and marked often by nocturnal exacerbations.

Aneurysm of the Sciatic Artery.

This vascular lesion, of which Bryan has reported several instances, is often marked by sciatic pain. It may arise spontaneously or as a result of trauma. The diagnosis will rest on the following syndrome: a pulsatile gluteal swelling, often associated with hard œdema of buttock; an aneurysmal bruit, with pain along the sciatic region. The differential diagnosis should include abscess, hygroma, *sciatic hernia*, gumma, cancer, and *pulsating sarcoma.*

Lesions of the Cauda Equina.

These constitute the chief causes of confusion with *root* sciatica, and the differentiation should proceed on the following lines:

Lesions of the cauda equina are frequently secondary to *trauma* or *malignant* and *tuberculous* diseases elsewhere.

The previous history and examination of the patient should in such cases furnish evidence of these factors.

The spinal column should then be investigated for *local* signs indicative of the action of trauma or of the presence of secondary deposits, such as *deficient mobility*, *deformity*, and *local tenderness* of the affected segments.

The clinical features will most closely simulate those of root sciatica when situate *below the level of the third lumbar vertebra*, for at this point the anterior crural and obturator nerves escape; but the sciatic is implicated, and an atrophic palsy of the muscles innervated by it or the sacral plexus ensues.

In this event, beyond the motor palsy involving in the latter instance the glutei and the muscles of the foot, there will be present *ano-vesical and sexual paralysis*, with anæsthesia in the related cutaneous areas.

If situated still lower—*i.e.*, below the second sacral root—no palsy of the lower extremity will be present, but on the other hand, symptoms indicative of the three last sacral and the coccygeal nerve roots will be noted.

In this instance the anæsthetic area will conform to the riding-breeches type, which includes the skin innervated by the small sciatic; but, as in the former lesion, vesical, rectal, and sexual paralysis will be present.

In contradistinction to the above lesions, our diagnosis of root sciatica will depend on the following characteristics:

Root sciatica is *unilateral in distribution*, whereas lesions of the cauda equina are generally bilateral.

Vesical, anal, and sexual palsies are absent in root sciatica, but present in lesions of the cauda equina.

CHAPTER XXIX

CRURAL NEURALGIA AND NEURITIS

Etiology.

The nerve trunks involved in crural neuralgia are the *anterior crural, external cutaneous,* and *obturator,* of which the first-named is the most frequently affected.

The causes of crural neuralgia are multiple, and those of indefinite origin are usually referred to chill, exhaustion, or excessive muscular exertion. But, as far as present knowledge goes, the only etiological factor—or perhaps, speaking more accurately, the only predisposing cause—is a *gouty* or so-called "rheumatic" diathesis.

According to some authorities, *diabetic* neuralgia not uncommonly picks out the anterior crural and obturator nerves.

In a thoughtful study of one of his own and six recorded cases of anterior crural neuritis, Waterhouse made the interesting observation that *glycosuria,* slight in degree, and readily amenable to treatment, was not infrequently present.

We may note that in one case under our care the subject was a zinc-worker, but whether this was of any etiological significance is uncertain. Cases, too, have been recorded after *infectious* diseases, as well as alcoholism.

Of *secondary* anterior crural neuralgia, the most important and by far the most frequent in our experience is *osteo-arthritis of the hip.* It is frequently associated with pain along the sciatic, and in our opinion coincident pains along the front and back of the thigh are almost of diagnostic significance in this disorder.

Lying as it does on the ilio-psoas muscle, anterior crural neuralgia may arise secondarily to *inflammatory changes in this muscle or its bursa,* or it may be a symptom of *enlargement of the inguinal glands;* or it may ensue reflexly as the result of *disease of the testicle or urethra.*

Obturator neuralgia, if strictly limited to this trunk, may be due to pressure or traction by an *obturator hernia,* and, needless to say, pains referred along this trunk are very commonly symptomatic of tuberculous disease, and, though less frequently, of osteo-arthritis of the hip.

In view of the frequency with which appendicitis is met with, it is interesting to note that Starr states that he has observed several instances of pain along the branches of the lumbar plexus following *appendicectomy*.

Neuralgia or neuritis of the *external cutaneous nerve*—the so-called "meralgia paræsthetica"—has been affiliated to many different causes. Thus, it has been traced to *trauma*, *influenza*, *syphilis*, *gonorrhœa*, and has been seen in association with *diabetes*, *alcoholism*, and *obesity*.

For our own part, we have been more struck with the frequency with which this type of neuralgia ensues secondarily to *static deformities of the lower limb*, notably flat-foot, or develops by extension out of an attack of fibrositis located in the ilio-tibial band.

Clinical Account.

Anterior Crural Neuralgia.

The disorder usually manifests itself by paræsthesiæ, and later by pain definitely referred to this particular trunk as it passes down the inner side of the leg. Tenderness to pressure is present within Scarpa's triangle, especially at the flexure of the groin. Sometimes *points douloureux* are present along the long saphenous branch.

The dividing-line between neuralgia and neuritis of this trunk is, as elsewhere, ill-defined; but the development of paræsthesiæ, with marked difficulty in flexion and adduction of the hip and extension of the knee, will be significant of neuritis.

Walking and also standing are painful, and to avoid traction the patient usually keeps his hip flexed. A feeling of insecurity in the knee is often complained of, a disability easily accounted for by the intimate connection which exists between the tendinous expansion of the quadriceps and the capsule of the knee-joint.

As in sciatica, subjective coldness of the surface of the thigh is a prominent feature, one, moreover, demonstrable by actual palpation.

In definite neuritis of this trunk, wasting of the thigh muscles, especially the quadriceps, is well marked. When tested electrically, these muscles, particularly the vastus internus, show delayed reaction time as compared with unimplicated muscles.

In rare instances the knee-jerk and cremasteric reflex are abolished, and, according to Oppenheim, vasomotor symptoms, hyperidrosis, and herpes are not infrequent complications.

External Cutaneous Neuralgia, or Meralgia Parœsthetica.

The symptoms in this condition are wholly *sensory*, and consist of pain or paræsthesiæ, or both combined. They are referred along the outer side of the thigh, in some instances as far as the level of the knee. They are most in evidence when walking or standing, but usually absent when sitting or lying down.

In several instances that have come under our care, the fascia over the tensor vaginæ femoris was the seat of *fibrositis*, with nodular and diffuse infiltrations, and presumably the nerve sheath was in this way implicated.

We have also seen many instances of it in association with *flat feet*, especially when this condition has been observed to develop in middle-aged women who have for some reason or other suddenly become obese, and the condition also sometimes develops in sequence to injuries of the foot.

The presence of anæsthesia over the area of distribution of this nerve is not uncommon, and Nawrazki found in one instance the pathological changes of neuritis and perineuritis, but resection in other instances has revealed no change in nerve or sheath.

Obturator Neuralgia.

This disorder rarely, if ever, occurs primarily, and in the majority of instances is *secondary* to disease of the hip, tuberculous or otherwise. The path of the pain is from the obturator foramen along the inner side of the thigh to the knee.

Diagnosis.

The chief point to recollect is that the foregoing neuralgias, with the exception of *meralgia parœsthetica*, are comparatively rare, and very commonly they are of *secondary* origin.

Thus, anterior crural neuralgia may be an early symptom of *increased intrapelvic pressure* by growths, etc., or of disease of the dorso-lumbar vertebræ; while an obturator neuralgia is usually due to *hip disease* or to a *hernia* in the obturator foramen.

In the same way, external cutaneous neuralgia may be due to *flat-foot*, *ill-fitting corsets*, *sugar in the urine*, or may be a sign of oncoming tabes, or possibly a tumour compressing the spinal roots.

Careful physical examination of the hip, abdomen, vagina, and rectum, together with X-ray illumination, will usually obviate the graver errors, while simple inspection of the naked limb should reveal those commoner instances due to static deformities.

General Crural Neuritis.

Cases in which implication of the nerve trunks is so extensive as to justify the foregoing appellation are comparatively rare; but such examples occasionally resort to spas for correction of the basal diathetic state—usually *gouty*—responsible for their onset.

The condition may in one sense be regarded as a sequel to sciatic neuritis, upon which affection in rare instances it engrafts itself. More commonly, though still rarely, the fibrous sheaths of several of the nerves supplying the lower extremity are simultaneously involved in a widespread *intrapelvic* fibrositis.

Indeed, Gowers has suggested that in some individuals there is almost an idiosyncratic tendency to inflammatory overgrowth of the fibrous tissues in the pelvic cavity.

In conclusion we would, however, emphasize the fact that simultaneous pain along the sciatic and anterior crural or obturator nerves is extremely common in *osteo-arthritis of the hip*, and this disorder should always be excluded before deciding as to the primary nature of the affection.

In these cases pain of varying degree courses down the implicated nerves and their branches, usually, however, predominating in one or other trunk.

Generally the sciatic bears the brunt, and the case, indeed, frequently passes as one of sciatica, when more detailed examination would have revealed the wider extent of the pain.

In others the greater suffering is along the anterior crural and its branches, but even in the same case at one period sciatica, at another anterior crural neuralgia, is most complained of.

Through its severity and wide range the activity of the patient may be greatly curtailed, and a *pseudo-paresis* develop in consequence of neuritis of the affected trunks, this being accompanied by wasting—always moderate—of the muscles concerned.

Increase of myotatic irritability is also usually present, with exaggeration or diminution of the electrical reactions in those muscles predominantly affected. In very exceptional instances the extensors of the knee may give the reaction of degeneration when the primarily augmented knee-jerk becomes abolished.

Occasionally similar pain, though less acute, may be felt in the opposite limb, and Gowers, discussing such cases, comments on their liability to confusion with disease of the spinal cord.

He lays stress upon the following points of differentiation: an inherited or acquired gouty diathesis, the tenderness of some of the nerve trunks near the pelvis, and the moderate character of the objective changes to be observed.

Examples of this class, in our experience, often prove very obstinate, running a protracted course, and no improvement may be looked for from any form of treatment which has not for its chief end the correction of the underlying taint.

CHAPTER XXX

BRACHIALGIA

In the upper limb we meet with brachialgia, the analogue of sciatica in the lower extremity.

Albeit, from the point of view of nomenclature, the term brachialgia is not so well defined as that of sciatica, whose usage is restricted to one particular nerve—the sciatic.

As opposed to this, the word "*brachialgia*" *is applied indifferently to pain affecting either the whole or part of the distribution of the brachial plexus.*

Otherwise the two conditions are strictly comparable, for brachialgia, like sciatica, may be significant of neuralgia or neuritis, and in the same way may be *primary* or *secondary* in origin.

Inasmuch as the causes of brachial neuralgia and brachial neuritis are substantially the same, they will be considered simultaneously.

Etiology.

Brachialgia is a comparatively common affection, and its subjects are almost invariably of neuropathic stock.

A most noticeable feature is the frequency with which it is met with in females, and the somewhat advanced age at which it develops.

Unlike sciatica, its incidence among women equals, if it does not actually exceed, that obtaining in men, while as regards age incidence Gowers states that five-sixths of the cases occur after fifty.

Gout.—An outstanding feature is the constancy with which this metabolic disorder figures in the ancestral or personal history of its victims.

In men definite signs of gout are almost invariably present, but in women one more commonly elicits an account of repeated attacks of some form or other of fibrositis—such as lumbago or sciatica—the evidence of a gouty taint being only deducible from the family history.

Rheumatic influences, more particularly "exposure to cold," are often cited as causes, and in both gouty or rheumatic types the nerve sheaths may be involved primarily, or they may be implicated secondarily through extension of the morbid process from the surrounding fibro-muscular structures.

Only rarely is any relationship to infectious diseases to be traced, *influenza* in our experience being most commonly responsible, but *gonorrhœa* has recently been emphasized as a cause.

Oppenheim has recorded three cases in the subjects of *diabetes*, and we have met with several instances in *lead-poisoning*. *Injuries* are occasionally responsible, a traumatic reflex neuralgia not infrequently resulting from bruising of the peripheral branches. In this connection, too, we have to bear in mind the extreme liability of the brachial plexus to injury through dislocation of the shoulder or by overextension of the nerves.

Apart from the foregoing *primary* types of brachialgia, we have to consider the varied etiology of the *secondary* types.

This may take the form of a neuralgia or neuritis, and not uncommonly the former condition shades into the latter. In the same way as sciatic neuralgia may be the first and sole symptom of increased *intrapelvic* pressure, so also may brachialgia be the isolated expression of increased *intrathoracic* pressure through a neoplasm or aneurysm in this cavity.

After the same fashion it may be indicative of infiltration or compression by some growth or inflammatory process in the meninges, or some morbid change in the cord or vertebral column or its vicinity, which involves the nerve roots or the brachial plexus.

Apart from these, a brachialgia may mask a *cervical rib*, *osteo-arthritis of the shoulder*, *subacromial bursitis*, *enlarged glands in the supraclavicular region or axilla*, syphilitic periostitis or a malignant growth in the scapula, or in the head or shaft of the humerus.

Other causes of secondary brachialgia to be borne in mind are those of *mechanical* origin, such as crutch palsy, or, what is more common, those instances in which the condition is secondary to some postural fault—a sagging downwards and forwards of the shoulder, leading to compression of the brachial plexus between the humerus and the first rib.

Brachial Neuralgia.

Clinical Account.

Neuralgia of the brachial plexus is usually unilateral, and is more commonly met with in the right than in the left upper extremity. It may affect either the whole or part of the area of distribution of the four lower cervical and first dorsal nerves.

Mode of Onset.—After preliminary feelings of uneasiness, numbness, or other abnormal sensations, the patient is suddenly seized with pain radiating from the neck or shoulder down the arm, sometimes as far as the fingers.

Distribution of Pain.—In isolated instances it may follow the track of the ulnar, musculo-spiral, or internal cutaneous trunks, more commonly the former. But in the vast majority of instances it can only be described as a pain in the upper limb of indefinite localization.

Comparably with what one meets occasionally in severe cases of sciatic neuralgia, the pain sometimes radiates to the trunk along the upper intercostal nerves or to the neck and face.

Character of Pain.—This is variously described as boring, burning, shooting, and so forth, and is remarkable for its extreme intensity. During a severe paroxysm the remissions of pain are so transient that the suffering appears almost continuous with exacerbations. Instinctively the patient grasps his arm, seeking to place it in a position obviating any pressure or traction, as such influences often appear to precipitate a paroxysm or aggravate the distress.

As compared with brachial neuritis the pain is relatively more spontaneous, and movement of the arm is not necessarily painful.

Again, in brachial neuritis the patient carefully avoids all movement, and in this way his behaviour contrasts with that of the person suffering from brachial neuralgia, who constantly changes the position of the limb.

With the decline of the paroxysm the severity of the pain lessens and the periods of remission lengthen. In its wake the skin is often left a prey to the most unpleasant tingling or formication, and with this is often associated hyperæsthesia of the related nerve areas.

Tender Points.—After repeated attacks the presence of such may sometimes be detected, but they are usually ephemeral, and their site from time to time undergoes variation.

Most commonly they are situated on the ulnar nerve (between the internal condyle and the olecranon), on the musculo-spiral as it circles the shaft of the humerus, on the median at the elbow or wrist joint, and on the circumflex where it gives off its main branch.

Persistent tenderness of the nerve trunks is absent, nor are there any permanent objective changes to be met with in unquestioned examples of brachial neuralgia.

Beyond a pseudo-muscular paresis, purely relative in degree to the intensity of the pain, no objective changes in the muscles are discernible.

But in all cases it is desirable that the muscles should be carefully palpated so as to exclude the presence of *nodules* or *infiltrations*, which far more frequently than is recognized are responsible for brachial neuralgia.

In common with all other neuralgias, the affection inclines strongly to chronicity. It is essentially discontinuous, with remissions of weeks' or even months' duration, and where the brachialgia is uninterrupted it is probable that the condition is one of *neuritis* rather than one of brachial neuralgia.

These remarks refer, of course, to the *primary* type, for obviously the duration of those depending on the disease outside the nerve trunk will vary according to the nature of the morbid process and its amenability to treatment.

Brachial Neuritis.

In our section dealing with brachial fibrositis we alluded to its occasional complication by brachial neuritis.

Thus, in a manner exactly comparable to what occurs in certain forms of sciatic neuritis, an extension of the inflammatory fibrous hyperplasia from the fibro-muscular structures to the actual nerve sheaths ensues. Apart from this secondary form, however, a *primary* inflammation of the nerve sheaths constituting the brachial plexus has to be considered.

Moreover, as in sciatic neuritis, occasionally the symptoms and objective signs point to the sheaths of the *nerve roots* rather than the plexus being the primary seat of the mischief.

In the radicular variety the involvement of the nerve roots is usually secondary to disease of the enveloping membranes or of the spinal column itself. Setting this aside, however, the responsible etiological factors are substantially the same as those cited for brachial neuralgia.

Clinical Account.

This presents all the features of *perineuritis* elsewhere, with this distinction—that it is of exceptionally painful character, and this, taken together with the somewhat advanced age of the patient, renders the affection a peculiarly trying one.

The *mode of Onset* is variable; it sometimes starts abruptly, the pain from the first being intense and unremitting, but far more commonly it is only *gradually* established. In the latter instance the subject in the early days of the malady is only conscious occasionally of pain, chiefly evoked during the performance of certain movements. But with the progress of the disease his suffering becomes more spontaneous and severe, and ultimately the pain is incessant, and intensified at times by paroxysmal exacerbations.

Distribution and Character of Pain.—In the initial stages it is as a rule referred to the *periphery* of the limb, either the hand or the posterior surface of the forearm; but it may be first noticed in the region of the scapula or axilla, and in our experience it may be very intense at the former site.

Later on, however, the pain tends to localize itself more definitely over the site of the plexus, either above the clavicle or in the axilla, radiating thence along the various nerve trunks, the track of which, as in sciatica, the patient will often accurately indicate with his finger-tip.

At the zenith of a paroxysm irradiation of the pain to the lateral surface of the chest, the lower part of the neck, and more rarely the trigeminal area, occasionally occurs. When well established, it is of the nature of a heavy absorbing ache, which with wearisome persistency permeates the whole of the disabled limb. This monotonous suffering is from time to time deepened by lancinating pain shooting down the arm.

Exacerbations are especially liable to be produced by any movement leading to passive congestion—a dependent posture, sneezing, and so forth.

Objective Sensory Changes.—As a result of the involvement of the nerve sheath, *tenderness* and swelling of the nerve trunks occur, and the presence of *parœsthesiœ* indicates the implication of the interstitial tissues. Definite loss of sensation may occur in severe and protracted cases, and, according to Gowers, may take the form of *anœsthesia dolorosa.* Such abolition of conducting power is very rare, and in the vast majority of instances any blunting of sensation is only ephemeral.

Muscular Atrophy.—Wasting of these structures is but rarely of high grade, and even in instances of considerable duration and severity the muscles, though flabby, may show little or no diminution in size.

In severe instances with secondary trophic change, *hyperidrosis*, *subcutaneous œdema*, and *thinning of the skin* are frequently present, while *arthritic changes* in the phalangeal joints are but too common, especially in the more aged subjects.

The *course* and *duration* are extremely variable. A primary brachial neuritis, if not very acute, may run its course in a few weeks and subside. Such a benign course is, however, the exception rather than the rule, the disease tending to be protracted, enduring for weeks or months, and only gradually passing away.

Such obstinacy is more typical of diathetic or toxic types, and those isolated instances in which the condition clears up in a comparatively short time are commonly of *traumatic* origin.

This concludes our account of the *primary* types of brachial neuralgia and neuritis, and we shall now proceed to discuss briefly the salient features in these disorders when of secondary origin.

Secondary Brachialgia.

Unlike the primary types, these tend in many instances to be *bilateral* in distribution, and this is particularly true if due to cervical caries or inflammatory changes in the meninges.

On the other hand, in *cervical rib* and tumours springing from the ribs the brachialgia is *unilateral*, but in the latter instance it tends to become symmetrical with the spread of the growth.

In those examples of neuralgia and neuritis resulting from compression, the pressure exerted may be localized either to the roots or trunks of the brachial plexus.

In the former the distribution and character of the sensory and muscular phenomena will be of radicular topography, whereas in the latter in these respects they will conform to the peripheral type.

Radicular Types.

In these forms the pains are commonly more severe and lancinating and more definitely paroxysmal or neuralgic in character than in those of peripheral type. Should an actual perineuritis of the nerve roots ensue, there will be tenderness over their site, while eventually muscular atrophy and sensory alterations of *radicular* topography will make their appearance.

In certain examples of radicular type that have come under our own notice, the symptoms were associated with *rheumatoid arthritis*, and the root lesions were presumably attributable to changes in the spinal column, or to *localized spinal meningitis* such as has been noted post mortem by Lepine in cases of this joint disorder.

In one example the implication of the *eighth cervical and first dorsal* roots was very clearly demonstrated by the fact that an herpetic eruption developed coincidentally over the sensory areas affiliated to these segments.

In addition there were present those marked *ocular* phenomena indicative of irritation of the branches of the sympathetic entering into relation with the first dorsal root—viz., miosis, a pseudo-ptosis, and a sunken eyeball.

Again, in other instances in which the *eighth cervical* nerve root appeared to be predominantly affected, we have noted as an early symptom increased tonicity or cramp of the *flexor* muscles of the forearm, as evidenced by a more vigorous response to tendon-tapping than the extensors, with subsequent atrophy of these same muscles.

Coincidently there were found present pain and objective sensory changes in the mid-line of the forearm and hand, chiefly in the direction of hyperalgesia, but we have in addition noted exceptions in the direction of diminished sensation.

We have also seen *localized sweatings* of this area—viz., on the skin of the mid-line of the forearm—and in addition palmar sweating; but on the other hand, we have known more than one instance in which the hyperidrosis was confined to the arm area, while over the palm no sweating was present.

The correlation of these *sensory*, *secretory*, and *motor* phenomena is explicable when we recollect that the eighth cervical segment is responsible for the sensory innervation of the mid-line of the forearm and hand and the flexor muscles of the wrist and digits.

The increased tonicity of the flexor muscles above referred to contrasts with what one encountered in cases in which the *seventh cervical* root was predominantly affected. In the latter there was present in the early stages cramp, and later atrophy of the *extensor* muscles, while the wrist and triceps reflexes were exaggerated.

The pain in these cases ran along the pre-axial border of the forearm and hand, while objective sensory changes, like those above noted, were observed in this same area.

Sensory alterations and muscular wasting of this same radicular topography are to be met with in *cervical rib*, but their incidence is not invariable. Indeed, a cervical rib may give rise to no symptoms, or, as in the example recorded by Dr. Waterhouse, and to whom we are indebted for the appended illustration, there may be only muscular wasting and no objective sensory changes.

On the other hand, in a somewhat interesting case of our own, the patient, a woman of thirty-five, had suffered from severe brachialgia for some years. There was no wasting of the small muscles of the hand, but there were definite sensory alterations in the hand, as evidenced by *proximality*, all stimuli applied, for example, to the skin of the terminal phalanx being referred to the mid or proximal phalanges.

Skiagraphically it proved to be a case of well-marked cervical rib, while the shoulder on the same side exhibited the condition known as "Sprengel's deformity."

Other features of prominent frequency in cervical rib are

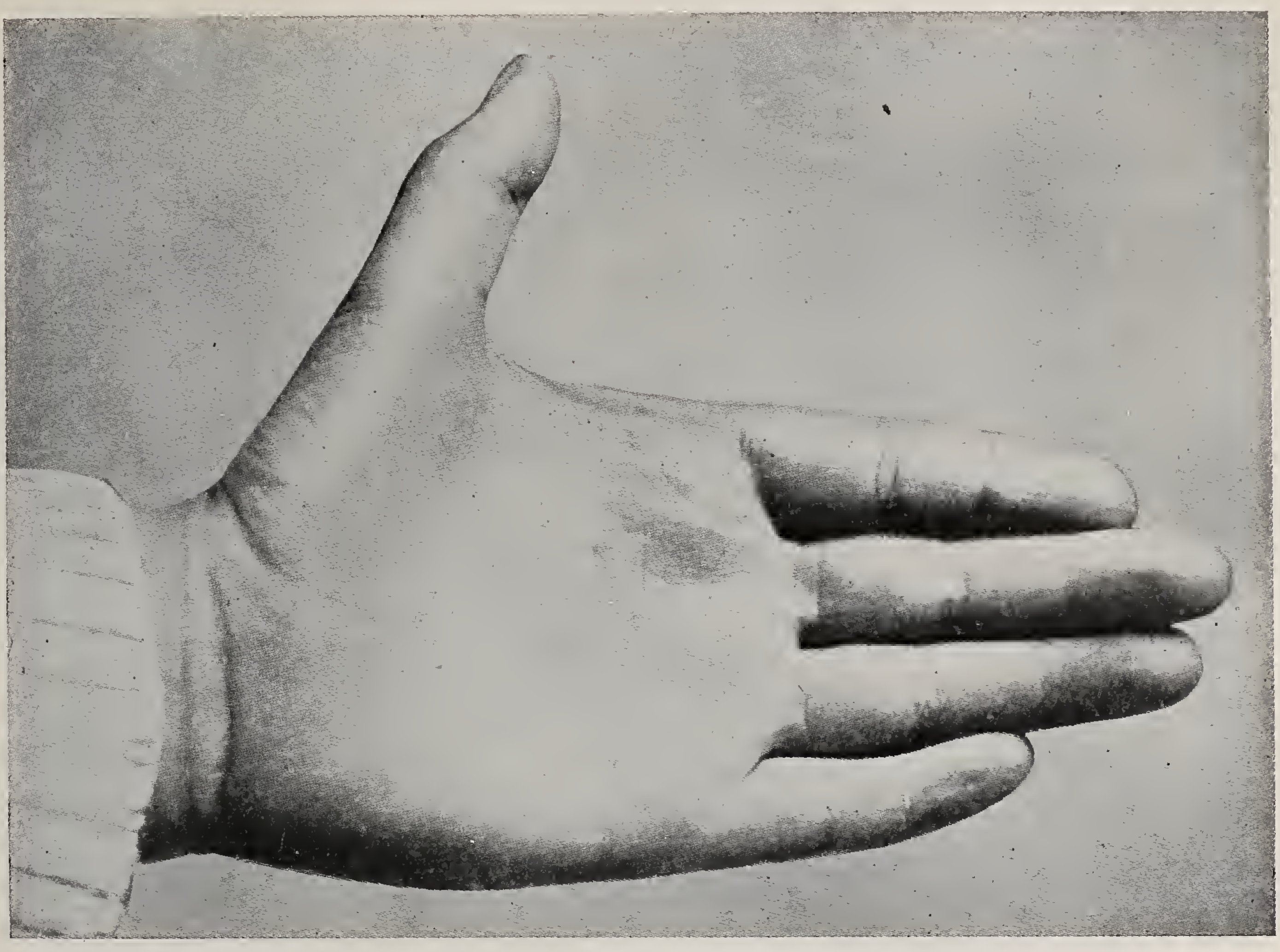


FIG. 81.—Palmar atrophy in a case of cervical rib.

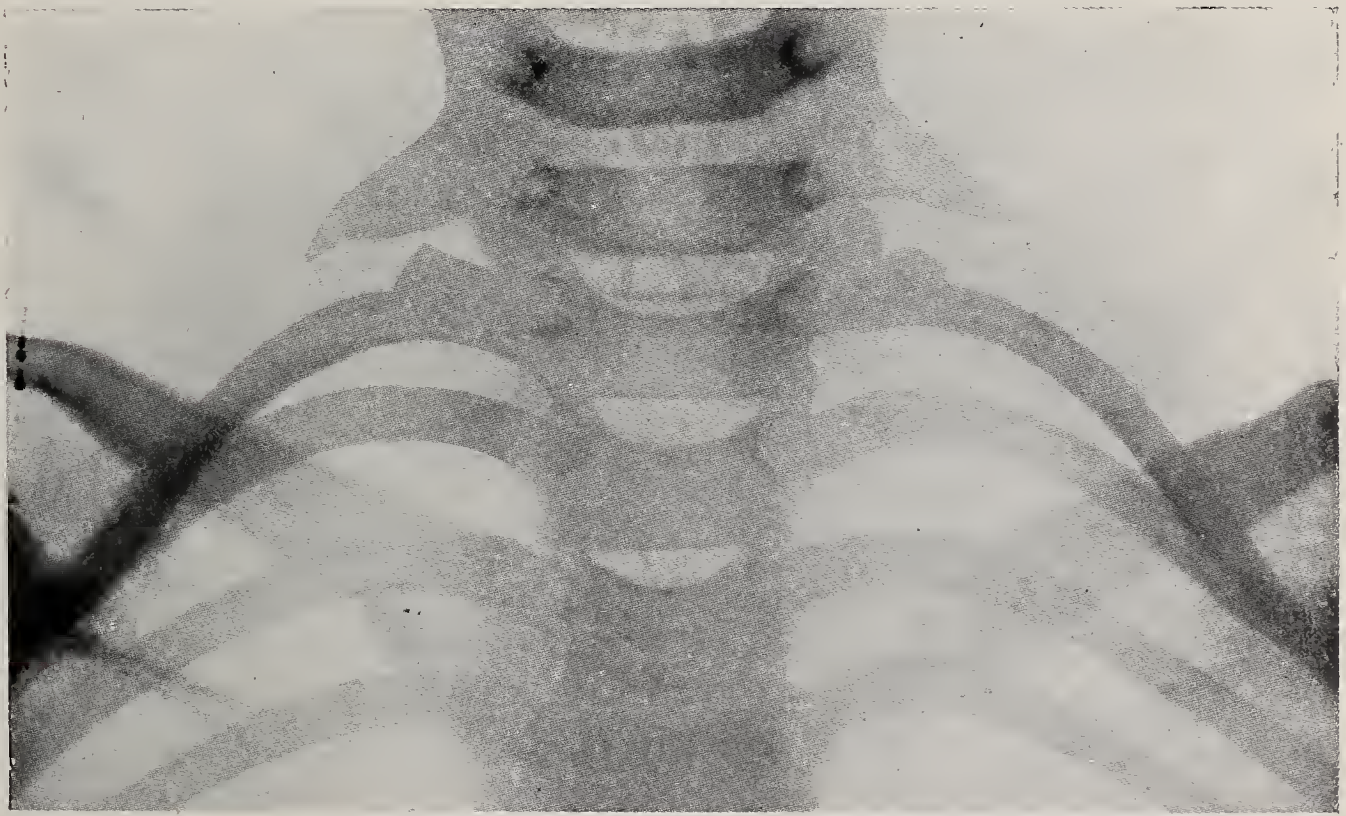


FIG. 82.—Skiagram of cervical region as in preceding figure, taken by Dr. Bowker, showing a rudimentary rib on either side.

ischæmia and cyanosis of the upper limb; but it is well to remember that cyanosis and œdema of the arm may with coincident brachialgia be symptomatic of an *aneurysm* or *malignant deposits* in the supraclavicular or axillary regions.

Lastly, where the brachialgia is secondary to *disease of the vertebræ*, the spinal column is often the seat of spontaneous pain, and individual segments are frequently extremely sensitive to percussion.

The *course* and *duration* will vary according to the nature of the underlying disorder, and, obviously, in instances where removal of the cause is impossible, the brachialgia tends to be indefinitely prolonged.

Diagnosis.

As in sciatica, the boundary between the *neuralgic* and *neuritic* types of brachialgia is but ill-defined, and although a differentiation should as far as possible be effected, it is far more important that in either case we should establish their *primary* or *secondary* origin.

Our first step should be localization of the site of the pain, whether situated along the nerve trunks or in their area of distribution.

The chief sources of confusion at this juncture are brachial or deltoid fibrositis and traumatic and other diseases of the shoulder-joint.

The pain in brachialgia radiates down the arm, and if localized to one trunk more than the other it is to the ulnar nerve.

In *brachial fibrositis* the pain and local tenderness are limited to some small area, the site of a *nodule* or *infiltration.*

It is not paroxysmal, but is aggravated and evoked by contraction of the affected muscle. Pain does not radiate down the arm unless a nodule in the deltoid or elsewhere impinges on a nerve trunk. Tenderness of the nerve trunks in these cases is absent.

In *affections of the shoulder*, such as osteo-arthritis and subacromial bursitis, the pain is localized commonly to the *subacromial or coracoid* regions; it does not radiate down the arm, nor is tenderness of the nerve trunk present.

These affections having been excluded, and the localization of the pain to the path of the nerve trunks having been ascertained, its neuralgic or neuritic character calls for discrimination.

Brachial Neuralgia is distinguished by the following characters:

1. Suddenness of onset.
2. Spontaneity of the pain which is referred commonly to area of distribution.
3. Periodicity and intermittency of the pain with periods of complete exemption.
4. Absence, or slight and fleeting nature of nerve tenderness.
5. Lack of muscular atrophy, electrical changes, and anæsthetic areas.

Brachial Neuritis is marked by—

1. Gradual and insidious onset.
2. Pain referred to the nerve trunk, and spontaneous only in later stages.
3. Constancy of the pain with absence of remissions.
4. Persistent tenderness of the nerve trunk.
5. In prolonged cases muscular atrophy, altered electrical reactions, anæsthetic areas, and trophic phenomena.

This distinction having been established, the following question remains to be decided:

Is the Brachialgia Primary or Secondary?

Its *secondary* character will be suggested by the following features:

1. The pain, commonly neuralgic, is referred to their area of distribution, rather than to the actual nerve trunks.
2. Though the pain may be unilateral, yet it is often symmetrical.
3. Tenderness of the nerve trunks is absent, or slight in proportion to the pain.
4. Presence of collateral symptoms, varying according to the nature of the *primary* disorder.

In addition to the preceding, we may add that, while in the primary forms of brachialgia skiagraphy is negative, in the secondary type an X-ray examination often discloses the exciting cause.

The determination of a *root* as opposed to a trunk type of brachialgia will depend upon the detection of areas of sensory change and muscular atrophy of *radicular* topography, and the likelihood of such an origin is much enhanced if the affection be *bilateral.*

Etiological Diagnosis.

This, both in the primary and secondary types, will largely be decided by the history of the case, and a thorough general and local examination of the subject by all physical methods, including skiagraphy.

In the former variety evidences of *ancestral or acquired gout* must be sought for, or indications of a so-called "rheumatic" diathesis established, and it is highly important, too, that the previous occurrence of an *injury, a recent dislocation or fracture,* should not be overlooked as a causal or contributory factor.

In the *secondary* forms we should be alive to the significance of a history of tubercle or the actual presence of lesions of this nature elsewhere as indicating the possibility of *cervical caries.*

Again, a previous operation on the breast or abdominal organs will suggest that perhaps a *secondary growth* in the vertebræ may be responsible for the brachialgia.

Signs of *syphilis* or a history of such affection should raise the question of an aneurysm or implication of the meninges as an exciting cause, while needless to say we should be alive to the danger of confusing the brachialgia with the *referred pains of angina pectoris or aortic regurgitation.*

Lastly, the detection of joint changes in the periphery, whether of atrophic or hypertrophic nature, would be suggestive of a *cervical spondylitis* of this type being the *fons et origo mali.*

Differential Diagnosis.

Confusion of the primary types of brachialgia with so-called *occupation myalgias* of the upper extremity must of course be avoided.

The discrimination is by no means always easy, but when considering the differential diagnosis of brachial fibrositis, with which they are also liable to be confused, we dealt in detail with the points which will be most helpful in effecting a distinction, and to such we refer the reader.

Affections of the Shoulder-Joint.—For differentiation of these we would refer the reader to the various sections dealing with articular fibrositis and subacromial bursitis, both of which are often misinterpreted as examples of brachialgia of "rheumatic" nature.

Cervical Rib.—The brachialgia in this case arises as the result of pressure upon the lower cords of the brachial plexus.

The affection is more commonly met with on the *right* side, and in *women* more often than in men, while the subjects are usually young adults.

Where the accessory rib gives rise to symptoms, there is commonly a history of persistent intermittent or constant pain in one upper limb, frequently extending over a number of years, and dating perhaps from adolescence.

Consequently, in any case of prolonged brachialgia, especially if showing signs of brachial neuritis, this particular cause of pressure must always be held in view, as simple brachial neuritis rarely extends beyond a twelvemonth.

In marked cases the salient symptoms are *palsy of the intrinsic palmar muscles, with anæsthesia of the ulnar side of forearm and hand.*

In cases of cervical rib the atrophy of palmar muscles is partial and selective, involving the abductor pollicis, opponens pollicis, and flexor brevis pollicis, while the remaining thenar muscles are unaffected.

This localized muscular atrophy is often conjoined with ischæmia and cyanosis of the hand and arm, Miller having observed these signs in five cases.

Inasmuch as it is often impossible to exclude the presence of a cervical rib by palpation, no delay in resorting to *skiagraphy* is desirable.

It is important, moreover, that such radiographs should be taken at different angles, so as to avoid overlooking the presence of a rib, which may curve abruptly forward.

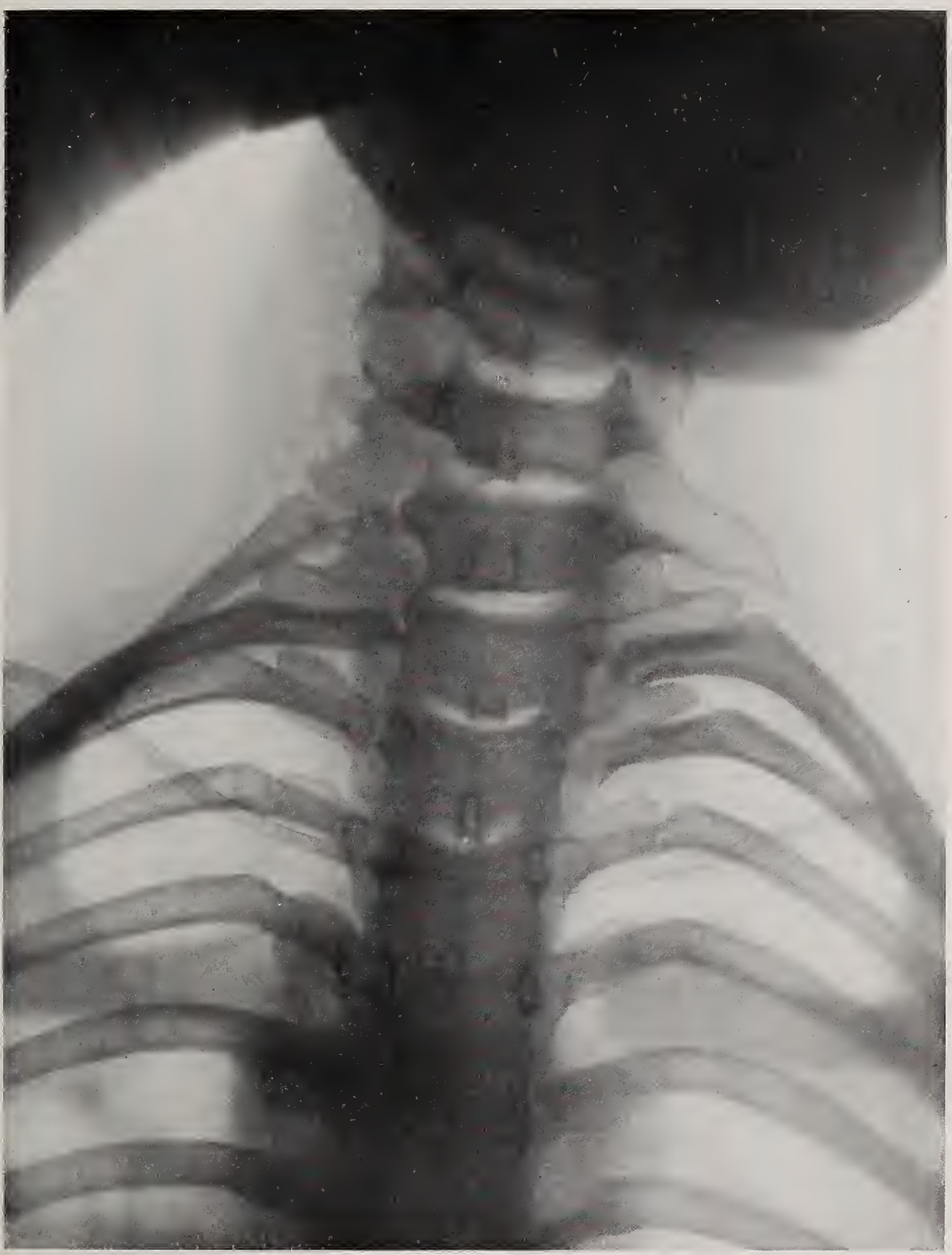


Fig. 83.—Skiagram showing complete cervical rib on one side and enlarged seventh cervical transverse process on the other.

To face page 388.

CHAPTER XXXI

NEURO-FIBROSITIS: GENERAL PROGNOSIS

In forming the prognosis of this variety of fibrositis we must take into consideration the following factors:

1. *The Underlying Constitutional State.*—A pronounced *gouty* diathesis or other toxic state often, if not always, predisposes to a lengthy duration of the illness. This is, of course, due on the one hand to the difficulty of controlling the formation and excretion of the responsible toxins, and on the other to the slowness with which the inflammatory products, once effused, undergo absorption.

2. *The Nature of the Pathological Process.*—This consists in an inflammation of the fibrous elements of the nerve sheath and of the interstitial tissues, accompanied by more or less effusion of inflammatory lymph, which, once poured out, must undergo absorption before recovery ensues.

Should resolution be tardy, the inflammatory products tend to become organized. The nerve sheath in this case becomes thickened, with maybe the formation of *nodular indurations*, while at the same time *adhesions* form between it and the trunk.

Should such occur, the liability to recurrence is greatly enhanced, and tends to chronicity of the affection.

Similarly, should the interstitial tissues be implicated, compression of the axis cylinders ensues, leading to impairment of the conducting fibres and trophic changes in the structures innervated by them, all such features of course presaging a long continuance of the morbid process.

3. *Presence or Absence of Neuropathic Disposition.*—If such a taint be in evidence, it materially darkens the outlook. The remote mental effects of the continued pain are also in these instances very much more easily induced, and at the same time more difficult of eradication.

4. *Age.*—The condition frequently arises in the later decades of life, and as, generally speaking, post-neuritic pain is at this period more obstinate, it follows that the older the patient the

more guarded should be our prognosis as to the duration and severity of the illness.

5. *Occupation.*—This factor is important in so far as it interferes with rest of the affected limb. This not only because of its clashing with the much-to-be-desired immobilization of the disabled extremity, but also because of the prejudicial effect upon the patient himself of incidental worry and strain, not to mention exposure to changes of weather.

In addition to the foregoing factors, environmental circumstances, mode of living, and the capacity for obtaining due nourishment should all enter into the terms of our forecast.

Finally, *ceteris paribus*, the more severe the symptoms the more protracted will be the illness, and *vice versa*.

6. *Variations according to Anatomical Site of Disease.*—The outlook in *primary sciatica* in regard to recovery is as a rule good.

The subsidence of an attack of sciatic neuritis is signalled by a decline in the *spontaneity* of the pain, while at a later stage of recovery exercise previously painful may be undertaken with impunity, and eventually the undue sensitiveness of the trunk disappears.

In any given case the *transmutation of evoked into spontaneous pain* is of evil augury, also its reference to the area of distribution rather than to the course of the nerve trunk.

The onset of a *benumbing* character in the pain, causing the limb to feel swollen, is an indication of *compression*, while the presence of muscular atrophy, fibrillary tremors, and cramps point also in the same direction.

The prognosis of *root sciatica* will depend very much as to the degree of accuracy with which we have been able to determine its etiology.

The most favourable cases are those in which a previous history of *syphilis* can be obtained, or evidence of such an origin in the shape of scars of a primary chancre or gummata, etc.

Should these or any other specific lesions be present, then the outlook may be looked upon as favourable, pending the administration of antisyphilitic remedies.

It is highly important that the true nature of these cases should not be overlooked, as obviously they would be irresponsive to other than specific treatment, and, the morbid process progressing unchecked, the destruction of the roots invaded is inevitable.

The extreme sensitiveness of the sensory nerve fibres of the brachial plexus, transcending almost that of the trigeminal nerve, doubtless accounts in no small measure for the long-drawn-out course *brachial neuralgia* or *neuritis* so frequently pursues.

Apart from this, the difficulty of imposing perfect rest upon parts so intrinsically mobile has a direct bearing upon the course, and incidentally the prognosis, of the malady.

Thus, those who have only experienced a slight attack, after a brief remission of pain, are apt to resume too soon the use of the painful member. Such imprudence is of course promptly resented by the still sensitive nerve, and a relapse—nay, too often a series of them—ensues, and in this way the affection is indefinitely prolonged.

As in so many other disorders, a serious attack in the first instance is sooner finished and done with than a slight one of the same nature.

We all know, for example, how a sharp hæmorrhage in ulcer of the stomach, through its moral effect, will induce seasonable co-operation on the part of a patient previously deaf to all suasion in regard to dietetic restrictions, rest, and so forth.

In the same way the subject of *severe* brachial neuralgia or neuritis is by the very extremity of his suffering soon convinced that rest at all costs is imperative. Hence the infrequency with which relapses occur in these acute varieties as compared with the subacute form.

A belated recognition of the *underlying diathetic condition* is responsible in some instances for the tardiness of progress, a sin of omission the evil consequences of which are frequently accentuated by a premature or too strenuous adoption of local measures, such as *massage*.

Still more should it be emphasized that *intramuscular nodules* abutting on the nerve sheaths make for chronicity, as, if their existence be overlooked and measures for their dispersal be not adopted, endless recurrences will certainly ensue.

In instances of neuritis, the outlook will be distinctly dark should the interstitial inflammatory process have been so intense as to produce compression of the funiculi, with sequential trophic changes.

For it sometimes happens that the limb never regains its pristine state, remaining permanently withered and disabled, while frequently paræsthesiæ and secondary neuralgias, peculiarly responsive to weather changes, add their quota to the patient's distress.

Those instances in which marked *atrophic* changes have ensued in the skin, especially the fingers, are in our experience the most hopeless, there being no escape from a gloomy prognosis in their presence.

CHAPTER XXXII

FIBROSITIS: GENERAL TREATMENT

THE ultimate aim of medical research in fibrositis or chronic rheumatism, as in all other diseases, is the prevention, if possible, of the malady and, failing that ideal, to compass its successful treatment.

Fortunately, in this disorder, with advancing knowledge our therapeutic measures are becoming more enlightened and less open to the charge of empiricism, which, indeed, has for so long been a well-merited reproach.

Now, it may be truly said that, in regard of drug treatment, we have not in this respect advanced much beyond our forebears, but this we may take to our comfort, that, as a result chiefly of bacteriological researches, our views as to the possible pathogeny of the disease are undergoing clarification; and this being so, our general treatment of the affection bids fair to become a fairly intelligent and rational procedure rather than a groping, empirical guess.

Another striking feature of modern as opposed to ancient therapeusis of this disorder is the diminishing importance attached to *medicinal* measures and the increasing stress laid upon the value of hydriatric and electrical procedures, as well as massage and other forms of physical therapy.

There are gleams of hope, too, that in the near future our therapeutic efforts may savour of a more direct assault on the microbial cause of the disease, and that in the shape of some autogenous vaccine.

Before proceeding to details, it will be advisable for us to outline our plan of procedure in regard of this aspect of our subject. In the present chapter we shall discuss more particularly the treatment of the *proximal or essential causes* of fibrositis—in other words, those conditions which are common to all types of the disorder, whether arthritic, muscular, or neuralgic in character.

These causal factors being substantially identical in all varieties of fibrositis, the contents of this section will be understood as applying to what may be termed the " general etiological treatment " suitable to the affection in all its manifestations, as by so doing we shall avoid needless reiteration.

We shall deal with the various therapeutic measures under the following headings: (1) Local foci of infection or toxic absorption; (2) dietetic regimen; (3) clothing; (4) climate and residence; (5) spa treatment; (6) massage and exercises; (7) general hydrotherapy; (8) active hyperæmia; (9) drug treatment; (10) vaccine-therapy.

As regards *local treatment* of the *arthritic*, *muscular*, and *nerve* types, this will be considered separately in subsequent chapters.

In each we shall discuss the local measures necessary for the relief of pain and stiffness, the absorption and removal of inflammatory products, and the prevention of recurrence, as well as prophylaxis.

As subheadings we shall consider the application of these principles in regard of, first, the *acute* types, and, secondly, the *subacute* or *chronic* varieties.

Localized Foci of Infection or Toxic Absorption.

We have in our section on etiology discussed the immediate and remote effects of *oral sepsis* in initiating and promoting the continuance of autotoxic states or subinfection.*

In the same way it cannot be doubted that suppurative processes in the tonsil, middle ear, or nose may be the source through which constant infection and reinfection of the lower levels of the alimentary canal ensue. Consequently, in all cases of " chronic rheumatism," of whatever type, our primary task will be the detection and radical treatment of such localized infective foci.

A thorough examination of the mouth and naso-pharynx is imperative, and during inspection artificial dentures should be removed, so that we fall not into the but too common error of overlooking concealed and often septic stumps.

We would lay stress upon this point, as buried fangs as a source of suppuration and toxic absorption are but too frequently lost sight of, and here there is no doubt that X-ray illumination will find increasing scope in unmasking their presence.

---

* Smith and Barrett hold that the parasitic amœbæ of the mouth may be causally related to pyorrhœa alveolaris. Barrett detected the *Endamœba buccalis* (Prowazek) in forty-six examples, the amœbæ being actively motile. He failed to note their presence in mouths not showing peridental inflammation. Its similarity to the protozoon of dysentery suggested the use of emetine. A ½ per cent. solution of the hydrochloride was injected locally, and after three injections the pus disappeared, the gums and teeth felt firmer, and the amœbæ were no longer detectable. Stahl, in several cases of *chronic arthritis*, associated with pyorrhœa alveolaris, found amœbæ present in the gum lesions and also the tonsillar crypts. Emetine injected locally, given hypodermically, or swallowed, led to disappearance of the amœbæ and subsidence of the joint disorder.

If oral sepsis or pyorrhœa alveolaris exists, carious teeth, if present, should be extracted, or their cavities cleansed and filled. Accumulations of tartar should be removed, and unhealthy gums attended to. Where the extraction of many teeth is called for, it should be preceded by as thorough a cleansing of the mouth as can be assured. From our own experience we feel this to be a very necessary preliminary, as we have seen severe relapses follow neglect of this precaution, owing to the enhanced toxic absorption from the extensive raw surface. A persevering use of antiseptic mouth-washes, peroxide of hydrogen, etc., reinforced by thorough brushing and " silking " of teeth, is called for.

As recently pointed out, the local use of radio-active waters, even in comparatively dilute solutions, is undoubtedly of value in promoting oral asepsis, and the special appliances in use at Bath, such as *niton* sprays and inhalations, afford a valuable adjunct to our rational treatment of this oftentimes intractable disorder. Where such are not available, the aid of *autogenous vaccines* should be enlisted, as sometimes, though not invariably, striking benefit follows. The dose and spacing of such injections will, of course, have to be decided by the particular requirements of individual cases.

Recurring attacks of *tonsillitis*, if these apparently determine exacerbations or relapses, demand thorough local treatment, and if this fail, the propriety of removing the tonsils will demand consideration.

The *nasal passages* are more rarely a source of absorption, but the happiest results have followed their expert treatment in selected cases.

The *genito-urinary tracts* are sometimes the source of infection, and neglected gleets call for expert treatment, especially if the posterior urethra be involved.

Nor must we forget that *coliform infections of the urine* are sometimes at the root of muscular and other types of fibrositis, and call for treatment by autogenous vaccines.

Lastly, the presence or absence of *rectal ulceration* may have to be ascertained, as there is increasing evidence of its possible causal relationship to some so-called " chronic rheumatisms," particularly of articular localization.

In conclusion, we would lay stress on the importance of these localized foci of toxic absorption being thoroughly and radically attended to in patients of this class *before* they are sent, possibly long distances, to obtain spa treatment.

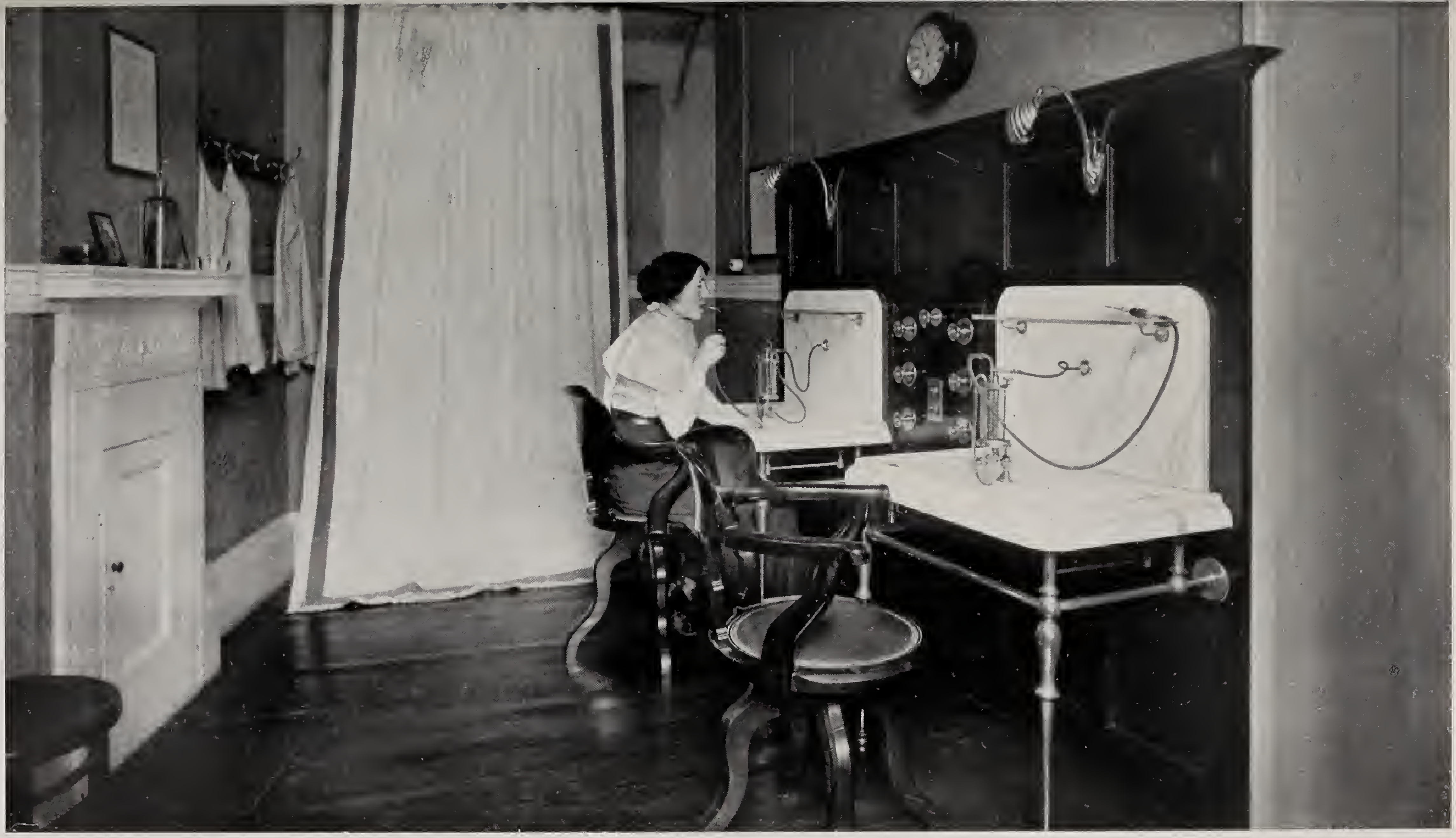


Fig. 84.—Radium inhalatorium in use at Bath, showing niton spray.

(By kind permission of the Bath Corporation.)

To face page 394.

Diet.

A glance at the assumed etiological factors distinctly suggests that, in the majority of instances, a faulty state of the blood-plasma—a subinfection or auto-intoxication—is responsible for the initiation of fibrositis. Presuming the alimentary canal to be the site of toxin formation, the cardinal importance, therefore, of intelligent dieting as a factor in successful treatment is obvious.

Broadly speaking, in all forms of fibrositis, whether acute or chronic, our efforts should be directed towards promoting a condition of *gastro-intestinal asepsis*. As experimental studies have shown, it is possible to inhibit the growth, and even to modify the character, of the intestinal flora by means of a judiciously selected and varied diet. The far-reaching nature of such an influence is clear, when we reflect that all abnormal fermentative and putrefactive processes in the alimentary canal appear to be referable to the action of microbial agents.

Diet in Acute Phases.

Under this heading we shall briefly outline the diet suitable for acute attacks of generalized and localized muscular fibrositis, also acute phases or exacerbations of periarthritis or the undifferentiated types of infective arthritis.

In the *muscular* types the febrile stage is so brief that total abstention from food for twenty-four to forty-eight hours is helpful rather than harmful. Consequently, where there is distaste for food, if not actual nausea, the subject will do well to follow his own inclination, and confine himself to hot water, barley-water, or hot weak tea.

Indeed, even in *acute periarthritis* at its very onset, to begin by such a modified process of starvation is often beneficial.

For by such a procedure the elimination of waste or toxic matters is facilitated, and the ingestion of hot water furthermore excites the hepatic cells and augments the secretion of bile.

Where liquid nourishment is taken, milk not only admits of easy digestion and rapid absorption, but also makes for intestinal asepsis; it should be given in small quantities at frequent intervals, and, if ill-digested, may be diluted with some alkaline waters or 3 to 5 grains of citrate of soda added to each tumblerful.

To avoid the monotony of such a diet, it may be varied by oatmeal or barley gruel, veal, chicken, or vegetable broths; but strong soups and animal extracts must be avoided. Any dislike to plain milk may be overcome by making it the vehicle for

Benger's or Mellin's Food, or, if preferred, Plasmon prepared in the same way may be substituted.

With the disappearance of fever and the decline of acute symptoms, fish may be introduced into the dietary, as well as farinaceous food. Later on a simple mixed regimen may be instituted, with such restrictions as may be deemed necessary to combat the very common tendency in these patients to functional gastro-intestinal or hepatic derangement, commonly in the direction of *excessive intestinal fermentation.*

Such in the main are the dietetic indications in the febrile or more acute stages of fibrositis, whether affecting *joint, muscle,* or *nerve.* But, as pointed out, not infrequently such cases, despite all forms of treatment, pass into a subacute or chronic phase. In such event a most careful study of the individual features in each instance is essential, if rational treatment is to be prosecuted.

Diet in Chronic Cases.

General Considerations.—Time was, and not so very distant, when the treatment of chronic fibrositis, like that of gout, might be practically summed up in Cullen's noted axiom, "Patience and flannel."

But with increase of knowledge our standard of therapeutic values has altered, and we now realize that in the treatment of chronic rheumatism or fibrositis the food is indeed more than raiment. For while the latter, if suitable, may confer relative immunity from the influence of exciting causes, it is only through the medium of a modified diet that we can reasonably hope to correct the basic toxicity of the blood-plasma.

At the same time a sane eclecticism should permeate our dietetic modifications, lest in seeking to steer clear of the Scylla of a too finicking faddism we fall foul of the Charybdis of a too rigid or indiscriminating routine.

First and foremost, a *thorough physical examination* is essential, and when, as often happens, an autotoxic state has to be postulated to explain the development of the disorder, every attempt should be made to localize and establish the exact nature of the functional aberration.

Accordingly, the manner in which the gastro-intestinal functions are performed should not be perfunctorily dismissed, but duly weighed, especially in regard to *daily* and *adequate evacuation of the bowels.* Any alteration in consistency, colour, or content of the fæces should be noted, so as to identify hepatic or pancreatic derangement. The behaviour of the skin, whether inactive or not, must also be taken into consideration.

An *analysis of the urine* should always be undertaken, its reaction noted, as well as any evidences of malassimilation or defective elimination, together with the presence or absence of substances indicative of excessive intestinal putrefaction.

Moreover, because of the marked penchant displayed by fibrositis for the middle and late decades of life, the general drift of metabolism, as betokened by a tendency to *obesity* or *undue leanness*, calls for recognition. In this connection, too, we must, as it were, take an inventory of the patient's *general mode of living*. His habits in respect of food and drink must be reviewed. Is mastication performed efficiently, is his diet excessive or improper in quality, or are his meals taken at irregular times ?

In the matter of *exercise* his occupation or pursuits require thought as to whether they involve excessive exertion or favour a sedentary habit, both of these factors having an intimate bearing on his power or not of disposing of ingested material.

All the foregoing bear intimately on the complex processes of digestion and metabolism, and the efficacy of our treatment will depend largely upon how far our regiminal modifications fulfil the particular needs of individual cases.

Diet in Gouty Cases.—As we have throughout insisted, many of these persons are the subjects of ancestral or acquired gout, and the clue to their dietetic treatment is, "Due nourishment, not gluttonous delight." For in these cases it is often not so much the quality of the food as the *quantity* which is at fault. In some of the less severe instances mere reduction in bulk of the pabulum of all kinds taken will suffice to obviate that constant toxicity of the blood-plasma which is at the root of their "rheumatic" manifestations. Such a course is particularly indicated in indolent or sedentary persons, in whom we may advantageously reduce the amount of food taken to the minimum consistent with the due maintenance of nutrition. Thus, second helpings and multiple courses should be refrained from, while condiments and salt should be largely eschewed.

When the patient is refractory and will not submit to such restrictions, resort must be had to subterfuge to compass the desired end. Plain, monotonous food, for example, should be enjoined, and highly spiced dishes tabooed because of their appetizing character. At the same time he should be encouraged to eat freely of food containing a large quantity of unassimilable material, such as green vegetables, so as to obviate that sinking sensation which habitual overeaters suffer on limitation of their food intake.

Where there is a disposition to *excessive intestinal fermentation*, as evidenced by symptoms of hyperacidity, with flatulence or distension, a stricter regimen must be enforced.

Here it is advisable to reduce, if not temporarily withdraw, *starchy* and *saccharine* foodstuffs from the dietary, such as bread, potatoes, pastry, milk puddings, sugar, and the like. The lighter kinds of fish, pigeon, and game may be allowed, and butcher's meat in moderation may be indulged in. Green vegetables and fresh fruit, raw or cooked, are especially valuable, in that they tend to reduce the hyperacidity of urine so often present. Fats are desirable, in that they tend to diminish the craving for carbohydrates, and, moreover, blunt the edge of the appetite.

In some few of these cases of a gouty origin the foregoing dietetic restrictions fail to effect a cure, and in this event a temporary resort to a *purin-free diet* may prove more successful. Under such circumstances meat, and especially the glands, liver, and sweetbread, as well as fish and the legumes, peas, beans, and lentils, with tea, coffee, and chocolate, must be eschewed. In lieu of these, substances comparatively poor in purin bodies must be exclusively taken. Milk, soured or curdled, buttermilk and whey, white bread, butter, eggs, cheese, macaroni, rice, tapioca, and sago puddings, cakes, pastry, etc., are all admissible. Vegetables, with the exception of the above-mentioned legumes, onions, and asparagus, likewise fruits, will come under this category.

Apart from its intrinsic merits, too, such a regimen has the further advantage of being distinctly unappetizing—a fact of some importance in these subjects so prone to excess. Moreover, such a diet is also suitable when, as sometimes happens, there are evidences of intestinal putrefaction.

In the matter of *alcohol* many gouty persons find it easier to abstain than to be abstemious, and for such abstinence should certainly be our counsel. When, for special reasons, it seems desirable to retain its use, preference should be given to well-matured spirits or light sound wine.

For flushing purposes 2 or 3 pints of fluid should be taken daily; but if the water be hard we should substitute distilled aerated or some natural lowly mineralized water, such as that of Evian-les-Bains.

Diet in Non-Gouty Cases.—Leaving aside definitely gouty persons, we have to bear in mind that *excessive acid fermentation* is a digestive derangement very often met with in the victims of fibrositis. Indeed, so frequent is its incidence that one is tempted to believe that many of its subjects, for some ill-understood reason, have a lowered tolerance for carbohydrate stuffs.

In recurring or obstinate cases presenting such disability it may be necessary for a time to adopt an even stricter regimen than the one outlined above. Thus, all starchy and saccharine foods having been withdrawn, the patient should partake freely of red meat, with abundance of hot water. This so-called "Salisbury diet" should be persevered in until this tendency to acid fermentation is overcome, when a gradual return to a mixed diet may be permitted. Some cases of this nature prove very refractory, and while prolonged continuance of such an exclusive protein diet is impracticable, we may to a certain extent modify this tendency to acid fermentation by limiting the intake of substances calculated to promote it. For we have to bear in mind that the acid products of fermentation are neutralized at the expense of the tissues, which are thereby deprived of calcium and other elements. Our aim, therefore, should be, not only to discountenance such substances as favour fermentation, but also at the same time to make up for this calcium leakage by an abundance of lime-containing substances. To fulfil the first indication, all acids, acid fruits, rhubarb, tomatoes, and asparagus, should be forbidden, also sweets and acid drinks, wine and malt liquors. Saccharine should be substituted for sugar.

Sir James Barr, who emphasizes so strongly this tendency to an acid fermentation, with resulting *calcium deficiency*, prohibits oatmeal, cane-sugar, and jam. As substitutes for these latter he prefers glucose and honey. Of fruits he favours grapes, nuts, bananas, prunes, and figs. He advocates strict moderation in regard to farinaceous foods, but enjoins regular and moderate consumption of green vegetables, while he deems fat highly desirable.

Hyperacidity of the urine is almost invariably present in the foregoing type of case, and as a rule their symptoms do not solidly improve until a normal reaction ensues under the influence of dietetic revisions, aided, possibly, by alkaline remedies.

Diet in Cases characterized by Urinary Hypo-Acidity.—This clinical variety was well recognized by some of the older physicians under the name of "asthenic" rheumatism. The subjects are usually of *neurasthenic* type, thin, pale, sallow, and given to neuralgic forms of fibrositis. Here a more or less generous diet, according to the debility of the system, should be prescribed. It should especially include all forms of fat, such as cream, fresh butter, bone-marrow, fat bacon, and suet puddings, these being taken up to the limits of digestive capacity. In these cases a moderate quantity of alcohol at meal-times is often helpful in promoting appetite and stimulating digestive processes.

Diet in Obese Subjects.—In all varieties of chronic rheumatism or fibrositis attended by obesity a reduction in body-weight is desirable.

It is especially called for in instances of *articular* type in which the manifestations are located in the lower extremities.

The joints being not only weak, but irritable, it is clear that excessive stoutness, particularly if of recent development, must inevitably throw increased strain on the already hampered articulations. Indeed, in all such cases, by reason of their infirmity, there is a tendency for them to become more indolent in habit, and Nemesis, in the guise of obesity, overtakes these patients, whose watchword should, like Falstaff's, be:

> "Make less thy body hence, and more thy grace;
> Leave gormandizing; know the grave doth gape
> For thee thrice wider than for other men."

In persons with a family tendency to corpulence, an essential point to consider will be prophylaxis.

They should be warned of the danger incurred by indulging to excess in fat-forming foods, and where stoutness is present their diet should be regulated and their habits in the matter of exercise revised.

Imbued with the importance of the *static* factor in these cases, we have now for many years made it a rule to reduce their body-weight, when excessive, to normal. Moreover, so uniformly has this course been attended by relief of the joint condition that we are convinced that, in the absence of contra-indications, any dietetic modifications we introduce should, as far as possible, be such as to promote this desirable end.

In a later section, when dealing with *villous arthritis* in which case the importance of such a static factor is very obvious, we have outlined the diet we generally adopt for reduction of body-weight.

In conclusion, the broad outlines of dietetic treatment of fibrositis consist in the *correction of any gouty tendency* and the *control or arrest of any fermentative or putrefactive processes in the intestinal canal.* Incidentally, too, we should not forget to impress on these subjects the importance of thorough mastication, as "food well chewed is well digested."

Regularity also in meal-times should be insisted upon, and where the subjects are of feeble type rest before and after repasts should be enjoined.

In short, it need hardly be urged that, in a condition so generally attributed to an autotoxæmia, every possible care should be taken to enhance the efficiency of the digestive processes, seeing that, as has been shrewdly observed, " Digestion is the handmaid of nutrition."

Clothing.

Clothing in so-called " rheumatic " subjects is a matter of paramount importance, having regard to their peculiar sensitiveness to atmospheric changes and the ease with which their cutaneous functions undergo derangement, very commonly in the direction of general or local hyperidrosis.

How important a rôle is played by the skin is obvious when we reflect that no less than 50 ounces of water escape through this avenue in an average adult each day of his life, not to mention appreciable quantities of carbonic acid as well as the more solid constituents of the sweat.

The maintenance of body-heat at a constant level, of course, depends very largely upon the efficiency with which these complex cutaneous functions are performed, and their due exercise is readily impeded by improper raiment.

Functions subserved by Clothing.—Clothes are in the first instance designed to insure warmth, and to prevent the undue dissipation of animal heat; but it is no less essential that they should fulfil the other desiderata demanded of rational garb. Firstly, the covering employed should be a *bad conductor of heat*, and for this purpose we should take advantage of the fact that air is the lightest and most efficient non-conducting medium.

How alive Nature has been to the importance of air-containing spaces in the conservation of warmth is evident from the protection she has provided for animals in the shape of fur, feathers, and wool.

But how frequently do " rheumatic " subjects, to their own detriment, wear heavy and close-fitting clothes, forgetful of the fact that loose garments, through their air-containing spaces, are, weight for weight, more retentive of warmth than the former!

For, apart from the mere question of unnecessary weight, clothes which are too heavy as well as too tight hamper the free and natural movement of the trunk and limbs, and so present a very real impediment to that regular exercise so essential for the " rheumatic " person.

In addition to *lightness and warmth*, it is necessary that the material utilized should be *absorbent*. The importance of this is obvious when we reflect that most cases of muscular fibrositis, especially lumbago, are accompanied by profuse sweating of the skin overlying the affected area. Under such circumstances we see how desirable it is that the texture lying next the integument should be highly absorptive, so as to obviate that constant sodden state of the skin which so directly favours local chilling by evaporation.

As evidence of the efficacy of such absorptive materials, we have known obstinate recurring lumbago, with local hyperidrosis, relent and disappear subsequently to the simple plan of placing a layer of blotting-paper next the skin over the loins, with frequent changes of the same.

Judged by the foregoing criteria, flannel, far from being the ideal, is perhaps the least eligible material for "rheumatic" subjects, and this in view of its low or deficient power of absorption.

Underwear most suitable for "Rheumatic" Subjects.—Consequently, in lieu thereof, it is wiser for "rheumatic" persons to resort to *silk*, *woven linen*, or *woollen* underwear. While a considerable difference of opinion obtains as to which of these different fabrics best fulfils the ends required, all at any rate agree as to the superiority of each of them over flannel.

Where the question of expense does not enter, underclothing of a pervious fine-mesh silk should be worn, and we have known patients previously prone to rheumatic manifestations almost entirely lose the tendency after adopting this type of vesture.

A single woollen garment, or so-called "combination," is excellent, as when wearing it patients are less liable to be affected by atmospheric variations, draughts, etc. On the other hand, the too prevalent habit of swathing their bodies in layers of wool is highly reprehensible. For, apart from unnecessary weight, the skin is, so to speak, enervated by the constant warmth and moisture which prevails owing to interference with the evaporation of sweat.

Woven linen, as Buckley points out, has the drawback of not affording adequate protection against the vicissitudes of a variable climate; but at the same time it does not interfere with evaporation, and the skin is kept dry.

To sum up, *silk* is perhaps the most ideal underwear, and next to this a single woollen or woven linen vesture is the most desirable, and, needless to say, with the marked tendency of these patients to sweating, frequent changes are essential.

Considerations in Regard to Outer Layers of Clothing.—Before leaving this question, however, we have to consider further the outer layers of clothing, and here the main points to insist on are that they should be *light*, *warm*, *easy*, and *not tight-fitting*. The cut, too, is of some importance, as—in cases of *lumbago*, for example—there is no doubt that the ordinary short jacket is hardly the most suitable, as it affords inadequate protection to the loins. This, too, is accentuated by the fact that the back of waistcoats is but too often made of thin or flimsy material.

There is no doubt that for this very reason some city dwellers find themselves less liable to attacks if they wear the conventional frock or morning coat, affording as they do more snug covering of the lumbar and gluteal regions. In others a Norfolk jacket may be worn with advantage where this same liability exists.

If such innovations in garb are objected to, they may be circumvented by enlisting a thicker fabric for the back of the waistcoat.

The frequency with which lumbago eventuates in sciatica clearly indicates that the buttocks should not be too lightly clothed, and the desired protection may be attained by the insertion of a silk lining to the seat of the trousers.

Sufferers from *sciatica*, too, should in addition wear warm long stockings, and not socks. In persons subject to *deltoid fibrositis* the waistcoats may be fitted with sleeves, and their vests should certainly be provided with the same.

The *joints*, unlike the muscles, take but little part in those metabolic changes which subserve the maintenance of bodily heat; hence their marked susceptibility to local chilling.

When the knees are affected, short pants are undesirable, and, if persisted in, long stockings extending above the joint, so as to secure continuity of covering, should be enjoined. Many subjects on their own initiative resort to linings of leather or kid over the affected joints, but these materials, by reason of their impervious nature, cannot be highly recommended.

Footwear, apart from static consideration, calls also for some comment. Where there is no tendency to flat feet, shoes have the advantage of allowing more ventilation than laced boots, and, moreover, the artificial support of the latter being lacking, there is less danger of the arch sinking through muscular inefficiency.

At the same time this statement must be qualified by the fact that in cold or wet weather laced boots furnish more adequate protection, and it need hardly be said that these subjects should be especially careful not to sit about in wet boots or socks.

When the hands are attacked, exercise is no doubt the best defence against coldness, with, as an accessory, some not too tight-fitting glove of fine-meshed wool or silk fabric in preference to kid, suède, or leather.

In conclusion, one would point out the risk that these persons run in conforming to the irrational custom of discarding summer or winter clothing on some arbitrary date, and this regardless of the prevailing climatic conditions. We have known many instances in which this slavish adherence has time after time resulted in an attack of fibrositis.

Equally important, too, is it that each case should be studied individually in regard of the two other great factors which co-operate with clothing in maintaining body-heat—*i.e.*, food and bodily exercise—whose bearing on the production of fibrositis has been considered elsewhere.

Climate and Residence.

The power of adaptation to an ever-changing environment is one of the most remarkable endowments of the human organism, but, naturally, individuals display wide differences in their capability of adjustment to variations in climate and season.

Thus, taken as a class, there can be no doubt that "rheumatic" subjects are conspicuously deficient in those defensive resources which enable normal persons to withstand with comparative impunity sudden transitions from cold to heat, dryness to damp, and so forth. As before stated, rapid changes in the surrounding air, either in its amount of warmth or in its motion by winds or draughts, markedly favour the development or aggravation of fibrositis, while insufficient protection from cold and damp furnishes abundant examples.

When we recollect, too, that in all probability the majority of subjects of fibrositis are on foot and about, we see that, in the presence of such a proclivity, a large portion of our duty will lie in warning them against places climatically unsuitable, or, failing this, in educating them how best to defend themselves against such vicissitudes. If, therefore, circumstances permit of free choice, we should certainly advise "rheumatic" subjects to seek a warm, dry climate.

Ideal Climatic Conditions.—The ideal climatic conditions for such individuals are low relative humidity, abundant sunshine, and a low rainfall. Too often permanent residence in such desirable surroundings is unattainable, but even temporary migration to more congenial environs is highly beneficial.

Climate suitable for Sedentary Persons.—Thus, for sedentary persons we should advocate their repairing to a bracing locality, such as Llandrindod, Harrogate, or some other resort of moderate elevation.

Under their stimulating influence oxidation processes are quickened, and though increased appetite leads to increased intake of food, yet this is compensated for by the buoyancy which finds an outlet in exercise, and so adequate elimination is assured.

Nor must we overlook, also, the tonic excitant effect exerted upon the cutaneous surface by the impingement of cool dry air, with its favouring influence on evaporation.

Climate suitable for Enfeebled Persons.—On the other hand, elderly or more delicate subjects often find bracing sites "too strong," as they term it, and the same is true of those of highly-strung temperament. Presumably, in the former instance the organism is incapable of reacting adequately to such stimulating climatic conditions, while in the latter the response to excitation is excessive. For these, therefore, a more sedative climate is indicated, the chief desiderata being *mildness*, *dryness*, and *equability*.

Places which are both cold and damp are unsuitable, and those that are warm and moist are likewise to be discountenanced for "rheumatic" persons.

Bath, with its low diurnal range of temperature and comparatively large amount of sunshine, is eminently adapted for this class of patient. Especially suitable is it for the midde-aged and old, whose "rheumatic" manifestations are often but another expression of the *gouty* diathesis, as well as for those unable to stand the, for them, too stimulating qualities of more bracing localities.

In singling out the foregoing resorts, we are far from suggesting that they and they alone are suitable for the subjects of fibrositis. We cite them simply as examples of locality suitable for some, ineligible for other, instances of this affection, and as a guide to the principles which govern our choice of other less well-known resorts.

Where wintering abroad seems advisable, Upper Egypt or Algiers possesses to a pre-eminent degree the essentials of warmth and dryness, though somewhat marred by the wide diurnal range of temperature and the not infrequent cold winds.

While the foregoing constitute the broad indications for climatic therapy in fibrositis, yet how frequently in daily practice are we foiled of our good intent by some one or other of those subtle peculiarities we term "idiosyncrasies"! For these individuals betray endless variations in their susceptibility to exciting causes, whether of intrinsic or extrinsic origin.

Thus, some, usually those of gouty habit, seem able to brave cold and damp with impunity, but are intolerant of the slightest indiscretion in diet, and for such one must not mince the often unwelcome truth that neither climate nor residence will absolve from the ill effects of improper or gluttonous feeding.

Others, who constitute the majority, are sensitive to the slightest atmospheric changes, and in their case the hoped-for benefits are often largely discounted by neglect of simple precautions against "chills."

How often does one see the "rheumatic" man after a strenuous round of golf fling himself at sundown on dew-laden grass, to reap the penalty of his carelessness in renewed stiffness on the morrow! Such people should be warned, therefore, against the evil consequences that inevitably follow excessive cooling of the skin surface when perspiring freely, and particularly if exhausted. Especially needful are such injunctions to patients seeking higher altitudes during spring and autumn, when hot noontides are tempered by cold mornings and chill evenings. It is by vigilantly shielding themselves from what experience has shown to be the most fertile intrinsic or extrinsic cause of relapse or exacerbation in their particular instance that the victims of fibrositis can best assure the beneficial effects of climatic changes.

Choice of Residence.—With this question of climate is intimately bound up the equally, if not more, important one of habitation, for undoubtedly there are "malevolent places on earth which single out our infirmities and strike at our weaker parts."

While the affluent in common with the migrant bird may with the varying seasons hie them to distant and more congenial climes, for most of us our dwelling-place doth rest upon our calling.

At the same time the malign influence of an adverse climate can be largely counteracted by living in *well-situated* and *sanitary* houses, which fortunately, with more enlightened legislation, come more and more within the reach of even the poor. If a certain latitude in matter of choice is allowable, the "rheumatic" person should favour a residence built on a *well-drained gravel soil on a slope, and sheltered from the north and east wind.*

Soil.—Clay should, where possible, be avoided; but if circumstances decree otherwise, they should choose a house on a decided slope, to secure good drainage for surface and subsoil water. Gravel with a substratum of clay, or lying in a loamy matrix, is equally undesirable, for it absorbs little heat, retains water, and is therefore, like clay, both cold and damp. Sandy soils, like gravel, if well drained, are very suitable, being permeable, absorbent of heat, and dry, always providing they be not superimposed upon clay, when their healthiness will depend on how far efficient drainage is procurable.

By the laity, residence on chalky strata is commonly believed to be conducive to " rheumatism," but, though little absorbent of heat, it has the pre-eminent advantage of *dryness.*

While little is known as to this question of soil in its relationship to so-called " chronic rheumatism," yet of its intimate bearing on the disorder none can help being convinced, when one notes the amelioration, and often complete disappearance, of such manifestations in the subject after removal to another site.

Aspect of House.—This is all-important, not only to insure relative freedom from certain winds, but also to secure abundant sunshine. A north or north-easterly frontage is, of course, cold, while the house which faces west or south-west is exposed to the driving rains that so commonly accompany winds from this quarter, and which, unless the walls be cemented or tiled, may be an overlooked source of dampness. Accordingly, a *south or south-east aspect* is best, as being both milder and dryer. Bedrooms should be so placed as to catch the morning sun, and on the importance of ample facilities for *ventilation* and *sunshine* we need not dilate.

Trees, while of value in sheltering from north and east winds, should not be so near as to overshadow the house, for, apart from the possible interception of sunshine, they promote dampness by impeding evaporation from the ground. In the immediate vicinity, therefore, preference should be given to evergreens over deciduous trees.

For the city dweller every care must be taken to insure the house being *damp-proof.* To this end free air-space beneath the floors is essential, and it is advisable that the ground on which the dwelling stands be sealed by cement.

With improved housing, the greater liability of the poorer classes will doubtless diminish, and, where practicable, such sufferers should always be counselled to seek the higher levels of the town wherein they chance to dwell. Equally desirable is it that they should try to avoid narrow streets with lofty houses, and which, therefore, are destitute of or deficient in sunlight.

By preference, those running east and west rather than north or south should be chosen, and if perchance the agricultural labourer has a choice of valleys, let him affect one running in the direction of the prevalent winds as being more salubrious.

We have dwelt at this length with the question of climate and residence, for atmospheric vicissitudes and no less insanitary habitations loom large in the etiology of fibrositis, and assuredly those who are exposed unduly to their menace may look for no lasting respite from its manifestations.

Indeed, in the words of the Sage of Norwich, we may say of the " rheumatic " subject: " He is happily situated who lives in places whose Air, Earth, and Water promote not the infirmities of his weaker parts, or is early removed into Regions that correct them."

Spa Treatment.

Radio-Active Waters.

The light shed by recent researches has largely dissipated the dark shadow of empiricism which has for so long clouded the practice of mineral-water drinking and bathing.

The imputation was one especially valid in regard to so-called "simple" or "indifferent" thermal waters, whose undoubted therapeutic value all thoughtful physicians felt to be insufficiently accounted for by prevailing theories.

There is, therefore, a peculiar fitness in the coincidence that it is in this very group that experimental investigations have proved so fruitful.

In attempting a brief résumé of these researches, one may recall the fact that Lord Rayleigh some years ago detected *helium* in the gases escaping in the King's Well at Bath. Being an inert gas forming no chemical compound, no therapeutic significance could at the time be attached to its presence. The missing link, however, was shortly supplied by Sir William Ramsay, who proved helium to be a derivative of radium. In proof thereof, that same year (1903) the Hon. R. J. Strutt, in the course of his study of the Bath waters, detected minute quantities of *radium*, both in the sediment and the water itself. The inference was swiftly drawn that the therapeutic efficacy of certain mineral springs was due to their radio-activity, and to properly estimate the significance of the term we must be familiar with at any rate the salient properties of radium.

Physical Properties of Radium.—According to the theory of transformation, radium is a "changing element" emitting alpha, beta, and gamma rays, and in addition a radio-active emanation. This latter is a typical radio-active product existing in a gaseous form, its production being due to the unceasing metamorphosis taking place in radium itself, each atom of which continuously ejects at a high velocity an atom of helium.

This expulsion of an atom of helium having ensued, the parent atom no longer exists as radium, but *radium emanation, or niton*, as it has more recently been designated.

Now, though, like helium, niton forms no chemical compound, yet, owing to its extreme "rate of change," it cannot be regarded as inert. In other words, to quote Sir William Ramsay's report, inasmuch "as the activity of these substances depends upon their rate of change, niton is a much more potent agent than radium; indeed, the potency of radium may be ascribed to the extent of at least 75 per cent. to the action of its product niton."

Radium emanation, or niton, again like its parent radium, goes through a rapid series of transformations, giving birth to helium, also radium A, B, C, and D (Rutherford), of which the first is a gas, and the four latter are solids. Coincidently, too, not only during the transformation of radium into niton, but also during the sequential change of radium A, B, and C into radium D, the so-called " beta rays " come into being.

This brief résumé shows that the radio-activity of mineral waters, far from being a simple problem, is one of bewildering intricacy.

From a therapeutic point of view, the most interesting and important fact is the one elicited by Lowenthal—viz., that the active agent is not, as was previously thought, radium itself, but the emanation derived from it.

In possession of the foregoing facts, we are now in a better position to grasp the significance of Sir William Ramsay's analysis of the Bath waters in respect of their radio-active content.

Density of the water from King's Well ..	1·0166
Osmotic pressure equivalent to that of a salt solution containing per litre ..	1·09 grammes NaCl.

Volume of gas in twenty-four hours from—

	Litres
King's Well	4,927
Cross Spring	218
Hetling Spring	218*
	5,363

Analysis of gas (King's Well)—parts per 10,000:

Carbon dioxide	360
Nitrogen, etc.	9,640

No oxygen, no hydrogen, no marsh gas.

The nitrogen contains—

Argon	73·63
Neon	23·34
Helium	2·97

From all three wells in twenty-four hours—

	Litres.
Argon	39
Neon	12½
Helium	1½

Gases dissolved in Pump-Room Water.—This water contains 18·5 volumes of gas per 1,000 of water. Its composition is—

Carbon dioxide	6·9
Nitrogen	11·6

---

* Estimated.

It had become somewhat aerated on drawing, but allowance has been made for that.

	Milligrammes, per Million Litres.
Radium in the water of the King's Well	0·1387
Niton (radium emanation) in the water of King's Well ..	1·73
Niton ,, ,, ,, ,, Cross Bath ..	1·19
Niton ,, ,, ,, ,, Hetling Bath ..	1·70
Niton ,, ,, gas from King's Well	33·65

The relative significance of these facts regarding the radioactivity of Bath waters will be more readily appreciated by comparison with the results of similar researches undertaken at Buxton upon the waters of that spa. Thus, Sir William Ramsay remarks: ". . . The gas from the King's Spring contains over 33 milligrammes of niton per million litres, and this is about four times as much as is contained in the natural gas from Buxton—viz., 7·7 and 8·5 milligrammes per million litres." On the basis of the foregoing authentic data we may take it as established that the waters of Bath are radio-active to a remarkable degree, and, as we know, Maché, Curie, and Laborde consider that " the higher the emanation from a given spring, the more striking are the physiological results."

We must now pass on to consider the physiological influences exerted upon the cells of the organism by the atomic disintegration of radium emanation.

Physiological Action of Radium Emanation.—Like all other indifferent respirable gases, radium emanation is physically soluble; but a chemical reaction, apparently, does not ensue. The degree to which it is taken up depends upon the co-efficient of absorption, temperature, and pressure, in which respect it resembles other gases foreign to the body.

It readily enters the organism in various ways, and just as rapidly achieves its exit; but the speed at which it passes through and out of the body varies according to the pathway of entry.

Inhalation.—When inspired into the alveolar spaces of the lung, it swiftly passes from thence into the blood, and in this way is carried to the myriad tissue cells, which, according to their specific solubility, take up the emanation.

Eventually, if the inhalation is prolonged sufficiently, saturation of the blood ensues. At the close of a séance a flow in the reverse direction takes place, the emanation escaping via the lungs, intestine, kidneys, and skin.

Oral Administration.—Taken by the mouth, Lazarus claims that it penetrates directly the stomach and intestine, passing thence by diffusion into the capillaries of the lymph and portal venous system.

This observer also maintains that the large amount of the emanation drunk passes actually into the arterial blood—a contention, too, supported by other investigators, who also have noted that the arterial blood of animals after drinking water charged with emanation is strongly radio-active.

Comparison of these two methods of administration—viz., *inhalation* and *drinking*—reveal striking differences in the rate at which absorption and excretion take place. When inhaled the emanation is rapidly absorbed, and with equal swiftness excreted—a process consuming but seconds of time.

But when radio-active water is drunk, absorption into the blood takes place but slowly from the intestine, and its exit thence out of the system is also relatively slowly effected, complete excretion not ensuing for some hours.

To quote Lazarus on this point, the excretion of emanation lasts *seconds* by inhalation, *minutes* with subcutaneous injection, *hours* with stomachal or rectal administration.

In this country repeated experiments by Bellingham Smith show that, however introduced, a general radio-activity of fleeting duration is induced throughout the body by emanation. Elimination, even after strong doses, is complete in four hours, and when taken *per os* it escapes by the bowels, and to a slight measure by the urine.

Most authorities are sceptical of its power to penetrate the epidermis, but Engelmann stoutly maintains that he has proved that in immersion baths the emanation does actually pass through the skin.

But pending further researches, the question of cutaneous absorption must remain *sub judice.*

Biological Effects.—While the action of radium itself is local, in contrast to this, its emanation exerts a general effect. In other words, it appears to be endowed with a power of profoundly influencing the subtle processes of tissue metamorphosis or metabolism.

Activation of the Body Ferments.—Among the various actions attributed to this mysterious agent, that of energizing the body ferments or enzymes is the most remarkable. The deep-felt consequences of such an influence become apparent when we contemplate the long chain of cleavage processes initiated in the various foodstuffs by the digestive enzymes as a necessary prelude to their absorption, assimilation, and ultimate transmutation into live protoplasm. Yet radium emanation, it is contended, actually can stimulate to greater efficiency the *proteolytic*, *glycolytic*, and *diastatic ferments* responsible for this remarkable series of phenomena.

Nor is this all, for the same agent, it is maintained, can enhance the initiating action of those oxidizing enzymes which set in motion the equally intricate disruptive processes marking the disintegration of living protoplasm.

Thus, Neuberg, Lowenthal, Edelstein, and others claim to have demonstrated the increased efficiency on the part of the *autolytic enzymes* charged with riving the protein molecule into nitrogenous bases and amido-bodies.

Should these investigations survive the touchstone of further research, it would suggest that radium emanation exerts its influence throughout the metabolic cycle, both in its anabolic and katabolic phase.

That a profound effect on organic metabolism should be the outstanding biological attribute of radium emanation is highly significant, for it is precisely in those conditions collectively termed "disorders of nutrition" that radio-active waters have found their chief rôle for centuries past.

Antiphlogistic Action.—In the presence of radium emanation the inflammatory reaction that normally follows the subcutaneous injection in rabbits of monosodium urate is profoundly modified. There is an absence of leucocytic infiltration, and the inflammatory process is much less intense, while, despite the absence of phagocytosis, the tophus disappears.

Its dissipation presumably takes place by solution and reabsorption—in other words, the radium emanation dissolves and disintegrates monosodium urate, and this not only *in vitro*, but in the living organism.

Influence on Uric Acid Metabolism.—In gouty subjects it has been shown by Gudzent, His, and others, that uric acid vanishes from the blood in the presence of radium emanation, and even tophi have been observed to undergo absorption. The explanation advanced by Gudzent is that in the blood of gouty subjects there exist two forms of monosodium urate. One, *lactam* urate, is unstable, but very soluble; the other, *lactim* urate, is stable, and relatively insoluble. Now, in these subjects a transformation of the soluble into the insoluble salt takes place so swiftly that the normal excretion of urates is prevented. The beneficial effects of radio-active waters in gout he believes to be due to the fact that the emanation prevents this transition of lactam into lactim urate, this latter being the salt found in the blood of the gouty.

In test-tube experiments Gudzent demonstrated, further, that the insoluble salt was changed into the soluble form when exposed to the action of one of the decomposition rays of radium—viz., *beta* rays.

In regard to these claims, that radium emanation has the power of keeping uric acid compounds in their more easily soluble forms, it is interesting to recall the conclusion arrived at by the *Lancet's* special Commission for the Investigation of Bath Waters. "The thermal waters of Bath exert a distinct solvent action on uric acid; in our experiments, for example, it was shown that Bath waters dissolved over five times the amount of uric acid that distilled water would similarly take up at blood-heat—*i.e.*, just under 100° F. Since the waters are drunk hot and used hot for bathing purposes, this fact may have an important relation to the therapeutics of Bath waters in the treatment of chronic gouty affections and rheumatism."

Increased Excretion of Uric Acid.—Delayed excretion of exogenous purin is, as we know, one of the most characteristic signs of gout; but, following emanation treatment, Lowenthal and others have noted that the organism apparently regained the power of dealing in a normal manner with exogenous purins, for when, at the close of the course, the capacity was tested with large amounts of purin bodies, excretion occurred normally. It would appear, therefore, that there is not only increased uric acid excretion during the progress of a séance of emanation, but also that this enhanced power of coping with purins is maintained subsequently.

Subjective Phenomena in Relation to Blood-Content and Excretion of Uric Acid.—While in the majority of instances amelioration of symptoms follows the disappearance of uric acid from the blood, in others improvement took place when its content in this respect remained unaltered.

Thus, a striking amendment occurred in a patient of His under radium emanation, notwithstanding that the blood contained uric acid; while in another, a subject of diffuse gouty nodules, no uric acid was found in the blood throughout the treatment, and yet the subject had repeated attacks of gout during this period.

The same discrepancy obtains in regard to excretion of uric acid in the urine. Mandel found that, out of seven gouty patients after treatment in an emanatorium, an increased excretion of uric acid ensued in two subjects; of the remainder, in two no alteration in average excretion took place, in two a slight diminution, and in one a marked decrease, to the extent of 50 per cent.

Now, in four of the seven cases an undoubted clinical and subjective improvement was observed, although the uric acid curve showed diminution rather than excretion.

It seems, therefore, clear that the beneficial effect of radioactive water involves something more than the dissipation of uric acid in the blood and its excretion in the urine.

Therapeutic Action and Application.

Alimentary Disorders of Gouty or Other Origin.—Beyond, therefore, its solvent action on gouty deposits, it seems possible that, through its suggestive capability of activating the body ferments, it may in some obscure way correct the particular warp responsible for the varied manifestations of this affection, *gout*, which we believe to be etiologically related to, or a predisposing factor in, so many cases of fibrositis.

Thus, through its stimulating action on the digestive enzymes it may prevent the formation of abnormal substances, or through its quickening of the autolytic ferments may hasten the disruption and excretion of such when formed. Here we would lay stress on the swiftness with which the *glycosuria* of gouty subjects vanishes under a course of Bath waters, and incidentally *neuralgic types of fibrositis*, so often met with in this association, undergo amelioration.

Again, to the powerful effect exerted by radium emanation on organic metabolism is to be referred its beneficial effects on those forms of fibrositis which, though not arising in frankly gouty subjects, are doubtless the outcome of subinfection or an autotoxic state.

Almost invariably in these cases do we find that some *functional hepatic or gastro-intestinal derangement* is at the root of their trouble. In many instances, as we know, a state of *chronic intestinal catarrh* is present, associated with hyperacidity and a lowered tolerance of carbohydrates.

In such cases the waters, when given in copious quantity and frequently, undoubtedly prove most beneficial. These effects are in part attributable to a flushing of the alimentary canal and tissues by the highly radio-active waters, and in part, perhaps, to their activating influence on the peptic and pancreatic ferments.

In contradistinction to the foregoing, such abundant ingestion of the waters is not to be advocated in *atonic types of dyspepsia* with lessened secretion. Given in small doses, however, it undoubtedly exerts a beneficial effect.

Also, in those types of fibrositis associated with *neurasthnia* and *nervous dyspepsia*, it is probable that the oftentimes favourable results which accrue are due to the fact that radium emanation apparently has a *sedative* effect on the nervous system.

In keeping with the somnolence and torpor which ensue in guinea-pigs exposed to the action of radium emanation is the undoubted fact that highly-strung individuals, when subjected to a combined bath, drinking, and inhalation cure, become less irritable, and lose the distressing tendency to sleeplessness.

Again, and for the same reasons, *intestinal irrigation* by these radio-active waters after the Plombières technique is justly esteemed in those cases of fibrositis attributable to intestinal catarrhs and *mucous colitis.* The constipation that these patients frequently suffer from is counteracted, and the regular removal of waste and toxic material insured.

Suggested Bactericidal Power.—Should recent researches, too, as to the efficacy of radio-active waters, even of low grade, in cases of oral sepsis be confirmed, it cannot be doubted that this will constitute an important aid in combating the local and remote effects of septic mouth states, which initiate so often the autotoxic states responsible for fibrositis.

In the same way pharyngeal and nasal affections, when present, seem to be benefited by the *inhalation of radio-active waters atomized by steam or air.* In this connection, too, by an ingenious apparatus recently installed at Bath, the natural "niton" gas is now in extensive use for inhalation or douching of the mouth and its accessory cavities.

The etiology of fibrositis, as we have before stated, is extremely diverse, and some of these cases are referable to *gonococcal* infection. Pagan Lowe in a recent communication commented on the marked manner in which such cases respond to treatment by radio-active waters. It is, therefore, worthy of note that the *antibactericidal* effect of emanation is particularly potent in the case of gonococci.

While German authorities are inclined to dispute their bactericidal action, a significant number of independent workers contend that the growth of organisms is retarded, if not actually inhibited. As to the truth of Pagan Lowe's clinical observations, our own experience confirms them.

We have in previous sections emphasized the importance of treating localized foci of infection in view of their possible etiological relationship to fibrositis. Thus, cases of leucorrhœa due to cervical catarrh often yield to prolonged and thorough *vaginal irrigation* with these radio-active waters, and in a condition like fibrositis of uncertain etiology we cannot afford to neglect the treatment of any possible source of toxic absorption.

As we have before insisted, it is of vital importance that we should, in essaying the treatment of fibrositis, take a broad view of the case in all its aspects; and, fortunately for us, this mode of therapy is not contra-indicated in grave general conditions, such as *increased arterial blood-pressure.* For it has been shown by Deutelmoser and Saubermann and others that radium emanation lessens the blood-pressure in arterio-sclerosis—a fact of some importance when we consider the frequency with which it is associated with gout.

As regards the methods of administration of radio-active waters, it cannot be doubted that the *combined bath, drink, and inhalation cure* is the most advantageous. The subcutaneous injection of radio-active water does not seem to possess outstanding advantages, while the danger of sepsis has always to be counted with.

Comparison of Artificial and Natural Radio-Active Waters.

With regard to the relative merits of natural as opposed to artificial radio-active waters, the time is hardly yet ripe for dogmatic assertion. In both alike the best results obtained are in gout and chronic rheumatism or fibrositis. Moreover, as far as the meagre statistics available enable us to judge, the benefits derived from artificial are not superior to those observed to follow a course of natural radio-active waters. Neither do they appear to be swifter or more infallible in their therapeutic action, and time has yet to show whether they will prove more enduring in their effects.

At present, too, we have to bear in mind that both the profession and the laity are being borne along by a wave of optimism in regard to the powers of this mysterious agent radium, and doubtless the powerful influence of suggestion makes itself felt in no small degree.

Out of the somewhat extravagant claims put forward, however, one salient fact emerges, that artificial like natural radio-active waters have their limitations. While under their influence, subjective amelioration ensues, and even tophi may disappear, yet both alike are powerless, apparently, in the presence of structural change.

Neither one nor the other can dissipate a muscle nodule or a diffuse infiltration of any standing, and, needless to say, neither can smooth away bony asperities or restore a crumbling cartilage.

This being so, it is difficult to say in what particular artificial radio-active water is superior to the product that issues from Nature's laboratory. The therapeutic limits of the latter have been fixed by centuries of experience, and, as far as present researches go, the newly-born commercial imitation has yet to prove itself endowed with a greater range of therapeutic possibilities.

Massage and Exercise.

Massage.

In scientifically applied massage we have no doubt an agent of pre-eminent value in the treatment of this affection.

Its beneficial results are not confined merely to the affected joints, muscles, or nerve sheaths, but, as the result of the improved circulation, waste products are more readily excreted, the nerve centres regain tone, and a general feeling of well-being is promoted.

We have previously pointed out that excessive or insufficient exercise may aggravate the tendency to chronic rheumatism, but that, on the other hand, in moderate exercise we have the surest safeguard against its development in predisposed subjects.

We should, therefore, in elderly or feeble persons, as well as in those who, by inclination or through stress of occupation, lead sedentary lives, advocate from time to time a course of general massage for its prophylactic effects.

When dealing with the etiology of muscular rheumatism, we laid stress on the important part played by accumulation of toxic products and fatigue stuffs in favouring, possibly, the growth of micro-organisms carried thereto by the blood-stream.

Now, as Zabludowski has experimentally shown, muscular vitality is greatly increased by massage, for he found that, when the contractility of the muscles had been exhausted by rhythmical application of induction currents, subsequent rest had relatively little effect in restoring their powers of contraction; but if, on the other hand, the muscles were kneaded, their contractile capacity returned very swiftly, and presumably because the manipulations had markedly promoted the dispersal of waste products of muscular metabolism.

It cannot be doubted, therefore, that general massage of the trunk and limbs, by hastening the excretion of the refuse, as it were, of metabolism, and at the same time by insuring more adequate supply of fresh blood to the tissues, must result in an access of renewed vitality. Many, indeed, have demonstrated that such a quickening of the vital processes does take place after general massage.

In enlisting its prophylactic action, it is not desirable that the time devoted to its application should exceed forty minutes, and it should in all cases be followed by an hour's rest.

To practise it too soon after a meal is not advisable, and in cases where it promotes sleep it is best undertaken in the late evening.

In coming sections dealing with the local treatment of the various types, we have, more particularly in regard of the muscular varieties, given a full description of the technique required for the dispersion of nodules and indurations.

Exercise.

Where, of course, it can be undertaken, active exercise proportionate to the age and strength of the patient should be enjoined, as the physiological effects of such are precisely similar to those exerted by rubbing.

For, as Sir Lauder Brunton once remarked, "At each relaxation of a muscle it tends to cause a vacuum within its surrounding fascia, into which the lymph flows from the muscular structures. At each contraction the muscle presses the lymph out, and these alternating muscular movements really act as a subsidiary heart."

This being so, we see how very important it is for these subjects, so prone to inflammatory changes in the muscles, that they should thoroughly avail themselves of this natural process of auto-massage, for that in effect is what exercise amounts to.

Indeed, it need hardly be said that all exercises prescribed must be suited to the capacity of the particular individual, and it is not desirable that they should be pushed beyond the point of moderate fatigue.

Young and fairly vigorous persons, if previously sedentary or of indolent habits, should be ordered regular exercise, which should be gradually increased so as to insure adequate expenditure of muscular and nerve energy.

In this way, through the enhanced muscular nutrition, the parts are, as it were, fortified against future attacks. They should, however, be warned against the injudicious practice of mixing indolence with exertion—in other words, remaining inactive for days, and then taking excessive exercise. Nothing is more pernicious than this, for a state of exhaustion rather than wholesome fatigue is produced, and the expected benefit is not seldom converted into an exciting cause of a fresh attack.

In the middle-aged, especially if obese, exercise should be graduated according to the capacity of their circulatory organs, and more stress laid on respiratory exercises and dietetic modifications to attain the wished-for reduction in body-weight.

It must not be forgotten that the evil effects of fatigue or over-exertion are readily induced in such subjects, often with grave consequences.

The same care, too, must be observed in long-standing cases, where a state of neurasthenia has supervened from prolonged pain. In such cases it is always wise to proceed tentatively, as they are often already on the verge of nerve bankruptcy.

Where the symptoms of exhausted nerve capital are pronounced, it is well to begin after a more leisurely fashion with massage and passive movements before proceeding to active exercise.

General Hydrotherapy.

Of all forms of treatment, hydrotherapeutic measures are perhaps the most valuable at our disposal for the treatment of "chronic rheumatism." Admirable as are the results obtained, it cannot be gainsaid that they would be much more uniformly achieved were the procedures prescribed with that care and discrimination we extend to other modes of therapy. The haphazard manner in which hydriatric methods are often prescribed calls for the strongest deprecation, as it is but too frequently lost sight of that these measures may often prove extremely harmful when misapplied.

These untoward consequences would be largely obviated if, not only the actual lesion, but the individual himself—his power of reaction to hydriatric procedures—were subjected to careful considerations. For the personal equation in this respect is of prime importance, as the character of the response varies greatly in different subjects, efficiency or not of the nervous and circulatory functions being the chief controlling factors.

Need for Discrimination in Selection of Measures.

Thus, some "rheumatic" persons are of *irritable neurasthenic cast*, and by reason of this intolerant of extremes of temperature, and in such subthermal or sedative applications are most suitable.

Others, again, suffer from *torpid circulation with sluggish vascular response*, and here stimulant measures, hot or cold, in sequence or alternation, are indicated.

Again, many are *obese*, others of *lean* kind. Here it is necessary to recollect that the corpulent react more feebly than the spare, but, on the other hand, they bear prolonged hydrotherapy much better. As opposed to this, thin persons react well, but often become rapidly exhausted, and suffer from *secondary chill* and other untoward consequences. These and similar considerations should constantly be held in mind in formulating a hydriatric prescription, always recollecting, too, that in "chronic rheumatism" our ultimate end and aim is to invoke the tonic and alterative effects of hydrotherapy.

Value of Subthermal and Cold Applications.—These patients are proverbially susceptible to atmospheric vicissitudes, draughts, and so forth. In order, therefore, to render them less abnormally responsive, we should endeavour to train these subjects to react favourably to the more stimulating effects of cold or subthermal procedures.

Though quite alive to the intrinsic value of *thermal* applications in " chronic rheumatism," we would lodge a very emphatic protest against the too prevalent obsession in their favour to the exclusion of subthermal or cold procedures, whose utility in these disorders is greatly under-estimated.

For cold baths stimulate oxidation processes, and in many forms of " chronic rheumatism " there is deficient oxidation of protein wastes; while in some of obese habit there is, on the other hand, deficient oxidation of fat. While, of course, each individual case must be judged as to its special requirements, still, we have no hesitation in affirming that by a system of carefully graduated baths and douches it is quite possible in most cases to enlist the good effects of cold as well as thermal applications.

In this section we are chiefly concerned with hydrotherapeutic applications entailing *exposure of the whole body*—in other words, those measures which involve, generally speaking, the treatment of the *underlying causal state.* They can be, and often are, combined with similar procedures directed to the joint, muscle, or nerve, predominantly affected; but for the technique of these *sectional* hydriatric applications we would refer the reader to the chapters dealing with the local treatment of the articular, muscular, and neural types respectively.

Methods of Application.

Whole-body exposure is indicated, broadly speaking, in all forms of " chronic rheumatism " where the original cause is some warp of metabolism or autotoxic state of which the arthritic, muscular, or other lesions are but local manifestations.

(*a*) Acute Diffuse Fibrositis.

If the subject be seen at the onset of one of those febrile attacks marked by nomadic pains, predominating either in the joints, muscle, or nerves, it is always advantageous to promote diaphoresis. For this purpose a hot bath, followed by a warm pack, is undoubtedly very effectual; but to secure the best results attention to detail is necessary.

Patients should be placed in a bath of water at a temperature of 100° to 102° F., both limbs and trunk being submerged.

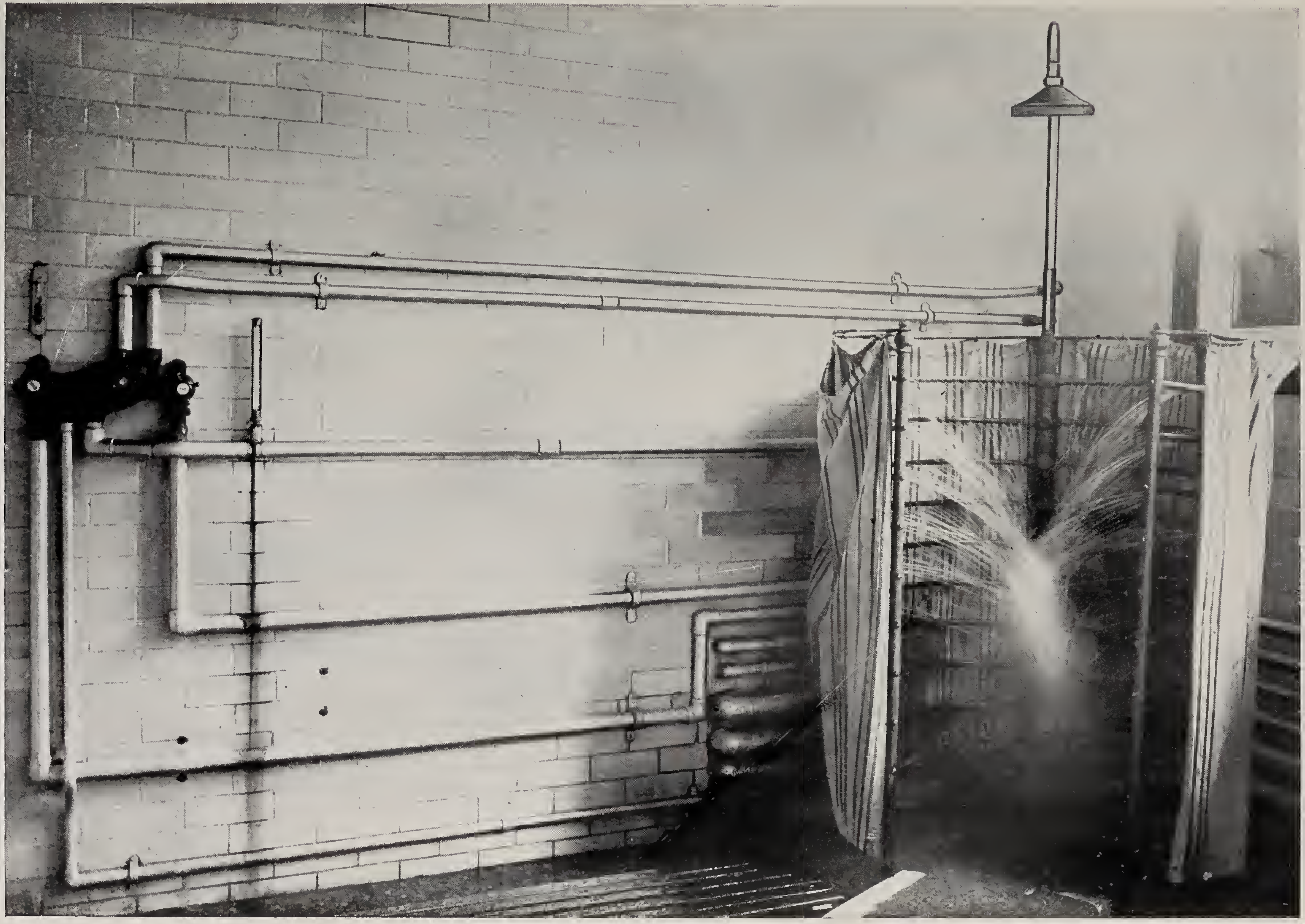


Fig. 85.—Circular needle douche.

To face page 420.

Hot water should then be added gradually, so as to raise the temperature of the bath up to 108° F., 110° F., or higher. The period of immersion will vary with the individual; but if the temperature be well maintained, as a rule a quarter of an hour is ample. Dizziness or faintness will indicate its being cut short.

Immediately on emerging, the patient must be wrapped in a warm sheet and rolled up in two or three blankets.

If there be headache, a cold bandage or turban may be applied to the head. Profuse sweating as a rule ensues in the pack, and may be promoted by free drinking of cold water.

If available, a vapour, hot-air, or Turkish bath may be substituted for the foregoing; but to be of any use they must be taken at the very onset of the malady, and to further their eliminative and diaphoretic effects a subsequent hot pack is always indicated.

Such measures are undoubtedly valuable for cutting short attacks of *acute muscular rheumatism* or aborting an impending attack of *sciatica.* They are not, however, suitable for the acute phases of periarthritis or infective arthritis, in which disorders the usefulness of hydrotherapy is limited to their *subacute* and *chronic* stages.

(*b*) **Measures suitable for Subacute Stages of Articular, Muscular, or Nerve Types.**

In the subacute stages of *articular* and *muscular* types, subthermal baths (82° to 97° F.) of fifteen to thirty minutes' duration are permissible, with douches of low pressure applied to sensitive joints or painful muscles.

Gouty subjects, who are very prone to muscular and other types of fibrositis, not seldom possess a *high arterial pressure,* and for such our treatment may be advantageously modified.

In such we have often found a course of immersion baths at 93° F., combined with fan douches, and applied according to the Bourbon-Lancy method, very beneficial, both in reducing blood-pressure and at the same time ameliorating the arthritic or muscular troubles.

Such neutral baths are also of great value in fibrositis attacking women in or about the *menopause*, a period at which they not uncommonly suffer from irregular manifestations of gout, as well as evidences of vasomotor instability.

Their good effects are referable to their marked sedative action, which renders them peculiarly adapted to all types of fibrositis or chronic rheumatism associated with *insomnia or irritable skin affections.*

In fibrositis affecting the *nerve sheaths*, such as sciatica attended with great pain, a neutral bath prolonged from thirty to forty-five minutes, or even longer, is of signal service in supplementing the good effects of other forms of local treatment, such as massage and electricity. The therapeutic action is, of course, more pronounced in the case of those *natural mineral* waters which fulfil the requirements of a neutral bath.

These are possessed in a high degree by the waters of Buxton, Ragatz, and Baden-Weiler, inasmuch as their average temperature approximates to the point of thermal indifference.

(*c*) Measures suitable for Chronic Articular, Muscular, or Nerve Types.

In cases of this nature, stimulant hydropathic procedures are called for. *Thermal waters* are the most suitable, and, *ceteris paribus*, the higher the temperature, the greater the excitant action.

Of *natural thermal baths* those of Bath, Aix-les-Bains, Gastein, and Wiesbaden are in great repute, and, speaking from personal experience of the first-named spa, we can unhesitatingly affirm that the efficacy of its waters in all forms of fibrositis lies beyond dispute.

They are exceptionally valuable when we wish to enlist a resolvent action to effect the absorption of exudates, reduce swelling, and increase mobility.

In a previous section we have dealt with their *radio-active* properties, and there is no question that the best results are obtained by a *combined bath*, *drink*, and *inhalation* cure.

To return to their application, simple immersion baths, 98° to 106° F., with or without massive undercurrent douches (110° F.), should be employed both for their general and local effects.

We have for many years used such a combination with most gratifying results in *lumbago* and *sciatica*, as well as in the *arthritic* types of fibrositis, the local douching exercising a distinct sedative action in addition to its resolvent effect.

Their efficacy is much enhanced by coincident or subsequent rubbing of the affected structures, the circulatory reaction through its direct revulsive as well as derivative effects proving most useful in hastening the absorption of exudates, nodules, or infiltrations, whether periarticular or located in the aponeurotic, tendinous, or muscular structures.

To increase the powers of resistance and diminish the susceptibility to chills, such hot applications should be followed in the first instance by non-percutient measures, such as cold towel rub, cold friction, or wet hand rubbing. Ultimately, a graduated series of cold douches may be enlisted, the temperature being lowered a degree or two at each séance, while the pressure of the douche at the same time is *pari passu* raised.

The duration of the bath will vary according to individual cases, but should not exceed fifteen minutes, while the subsequent cold application should not be prolonged beyond a few seconds.

Sool-Bader, or natural thermal brine waters, exert a similar excellent effect, but such are not available in this country. On the other hand, cold brine baths, whose action is precisely similar, are obtainable at Droitwich, Harrogate, and Builth, and to our knowledge are extremely efficacious, more particularly in chronic long-standing cases, with great thickening of the arthritic or related muscular structures.

Aix and Vichy Massage.

These procedures profoundly influence metabolism, and hasten the elimination of toxic and waste products.

Combining the influence of massage and warm temperature, they are among the most powerful means we possess of combating those states of autotoxæmia which are most commonly present in conditions of chronic fibrositis. As in warm immersion baths, enervating after-effects are apt to ensue, unless the tonic bracing effects of a terminal cold application be enlisted.

For this purpose we generally employ a circular needle douche, reducing the minimal temperature at each successive bath until in suitable cases a temperature of 90° to 70° F., or lower, is reached.

In many cases of chronic fibrositis the abdominal musculature is very flabby, with a tendency to visceroptosis, while the blood-pressure is low. Here a Vichy bath is preferable to Aix massage, the former raising, while the latter tends to lower, arterial pressure.

Vapour Baths.

This is one of the most powerful methods at our command for promoting the excretion of toxic products. It is contra-indicated in the old and feeble, and we have ourselves seen fainting and other untoward consequences supervene. It is also not to be recommended in the subjects of *advanced cardiac* or *renal disease.*

It is an extremely powerful eliminative measure, especially adapted to persons with *harsh, thickened, or irritable skin*, and of obese habit. It may take the form of a cabinet or Russian vapour bath, and to procure its most profound physiological effects a bath at 120° F. for fifteen to thirty minutes is necessary.

Increased susceptibility to atmospheric changes may result if there be not administered subsequently to each bath the necessary tepid or cold application.

At Bath, Aix-les-Bains, Luchon, and elsewhere, natural vapour baths are in great vogue. Frequently they are used as a means of heating the skin prior to an Aix or Vichy bath, or some cold application, and under such circumstances an exposure of three to five minutes at 120° F. is sufficient.

While all the foregoing methods are obtainable only at well-equipped spas, there is no doubt that the benefit of hydrotherapy, more especially as a prophylactic measure, is within the reach of all who possess the convenience of a modern bath-room.

Prophylactic Measures.

Such patients should be taught to harden themselves by the use of tepid baths, followed by a shower-bath or rain spray. If more sensitive, they should, while standing in warm or tepid water, briskly rub the rest of the body with a coarse towel wrung out of cold water.

Or they may instead for this purpose use water to which salt has been added to the point of saturation.

Also there is good reason to believe that many of the subjects of fibrositis, especially those of gouty habit, derive great benefit from a course of sea-baths.

Before drawing to a close this brief account of general hydrotherapy as used in the subjects of fibrositis, it is, we think, advisable to allude to some of the untoward consequences that may follow inappropriate or too drastic measures.

Untoward Results or Complications of Hydrotherapy.

Among the commoner of these are vertigo, fainting, palpitation, sleeplessness, loss of appetite and strength.

Vertigo, fainting, or *palpitation* usually ensue if hot baths are too prolonged, and to prevent their recurrence the duration of the bath should be diminished. Where palpitation is troublesome we should also, if douches are employed, see that their pressure is not excessive, and that the precordial area is not encroached upon.

Insomnia, which is often an unpleasant sequel, is often referable to excessive excitation. The bath may be either too hot or

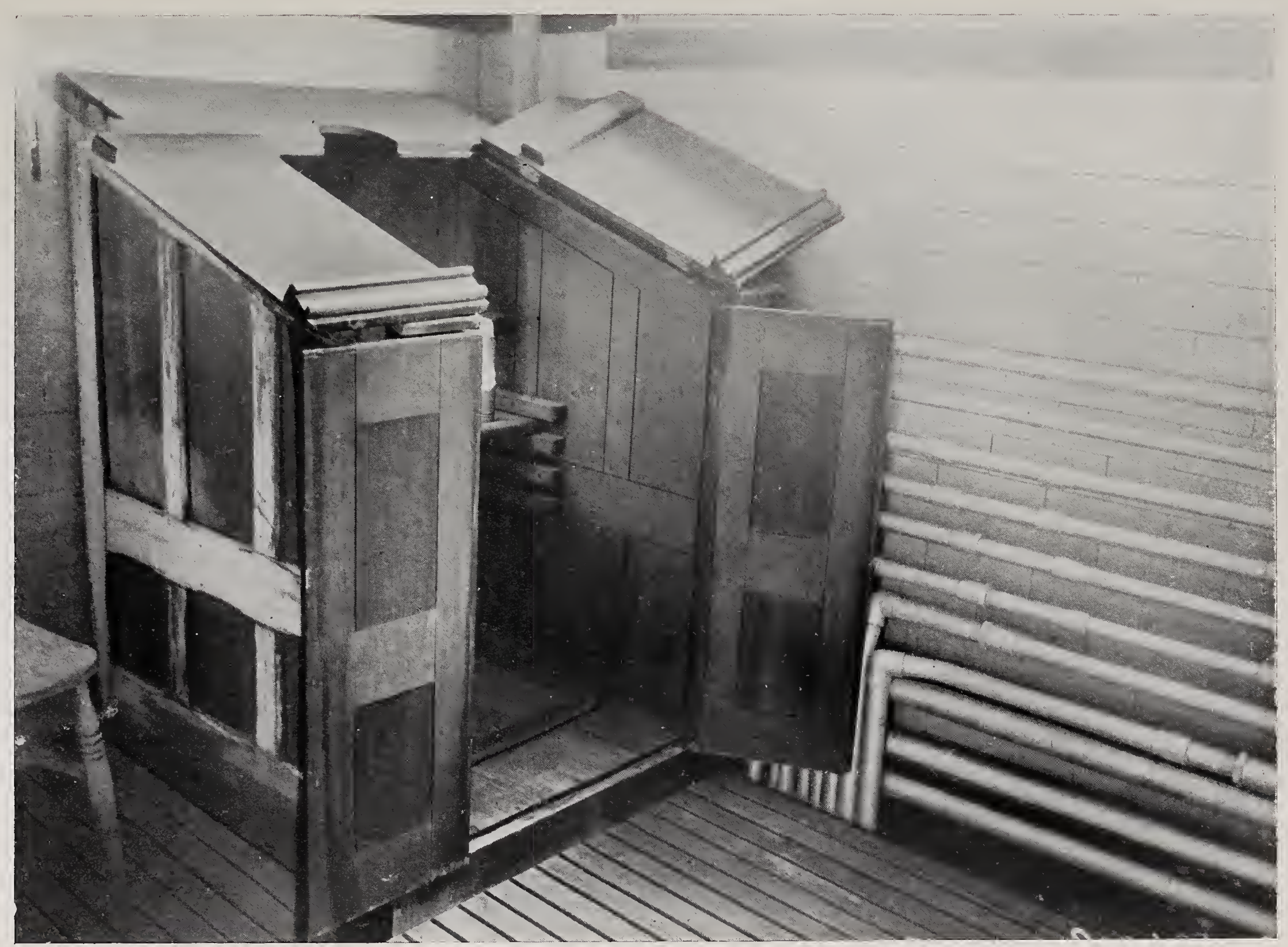


FIG. 86.—Cabinet vapour bath.

To face page 424.

too cold, or the douching too powerful. The tendency to sleeplessness will be usually overcome by substituting neutral baths for the douche-massage treatment. In other instances we may sometimes achieve the same result by giving a neutral bath at bedtime, while still continuing the stronger hydriatric procedures in the forenoon.

Loss of appetite and strength must be counteracted by the use of more highly tonic procedures. At the same time it must be remembered that their occurrence sometimes indicates that the treatment has been too drastic and the patient's energy overtaxed by excessive reaction.

Indications of Beneficial or Adverse Effects on Metabolism.

In all cases it is highly important that the influence of the treatment on the general trend of metabolism should be carefully observed. The patient's *body-weight* should from time to time be noted, and especially any real *gain or loss in muscular strength.*

An obese patient, for example, if he drop in weight and increase in muscular strength, is in all probability doing well. On the other hand, if his muscular capacity decline with his sinking weight we may be certain that excessive demands are being made on his eliminative and oxidizing processes.

At the same time we should not be too ready to conclude that a course of hydrotherapy is unsuitable. For very commonly during the earlier part of the treatment persons complain greatly of headache and malaise, and if easily discouraged may unwisely cut short their course. Often *excessive deposits of urates* are also present in the urine, but if so, we may reassure them that the treatment nevertheless is quite applicable to their case, and that as elimination improves these unpleasant symptoms will disappear.

In this connection, too, the *output of chlorides* in the urine is a matter of importance, as a notable increase will be suggestive of excessive tissue waste. Again, many of these subjects are neurasthenic in consequence of prolonged pain, and if their urine show a greater increase of *phosphates* it may be taken that the measures adopted have led to too great excitation of the nervous centres. In the same way a trace of *albumen* or *sugar* will be significant of too great an intensity in the measures adopted.

Lastly, we would drive home this essential fact that all measures of general therapy should be preceded by a *thorough physical examination*, and that throughout the course they should be subjected to constant observation, in view of the profound influence these procedures exert on general metabolism.

Treatment by Hyperæmia.

Enhanced oxidation and destruction of nitrogen-containing waste and toxins being one of the primary indications in the treatment of all so-called "autotoxic states," it is not surprising that hot-air baths are so extensively employed in fibrositis.

For, briefly put, under their influence the body temperature is raised, the oxidation of protein substances of residual or toxic nature is greatly stimulated, while their speedy elimination is insured through the profuse diaphoresis induced.

Obviously, in view of their profound physiological action, their indiscriminate use is not unattended with risk, and even in suitable cases much will depend on attention to details of technique.

Active hyperæmia is best adapted for general exposure, the entire body, with the exception of the head, being surrounded by a superheated atmosphere.

Varieties of Hot-Air Baths.

Both luminous and non-luminous types are available for this purpose, the latter being represented by the Tallerman-Sheffield, Greville, and Tyrnauer systems, and the former by the incandescent-light bath and the Dowsing modification.

In the first group the therapeutic properties of *heat* alone are invoked, but in the second those of *light* are superadded.

Respective Merits.—In the luminous variety a greater reaction takes place, and this at a lower temperature than the non-luminous type.

Thus perspiration appears in from three to six minutes, even when the air surrounding the patient may be some degrees below the normal body-heat. Moreover, the elevation of body temperature ultimately produced exceeds that occasioned by the latter, hence its excitant effect on metabolic processes is deepened. Personally, after prolonged experience of all these modes of inducing hyperæmia, we have no hesitation in affirming our preference for the incandescent-light bath.

Therapeutic Indications.—While all subjects of fibrositis at some period of their life-history may be eligible for hot-air baths, their use is contra-indicated in the presence of *pyrexia.*

Neither is it suitable if the case is complicated by any *irritable skin condition,* or in *emaciated diabetics,* or in those not infrequent instances where "rheumatic" manifestations occur in the subjects of *hyperthyroidism.* Great caution, too, is neces-

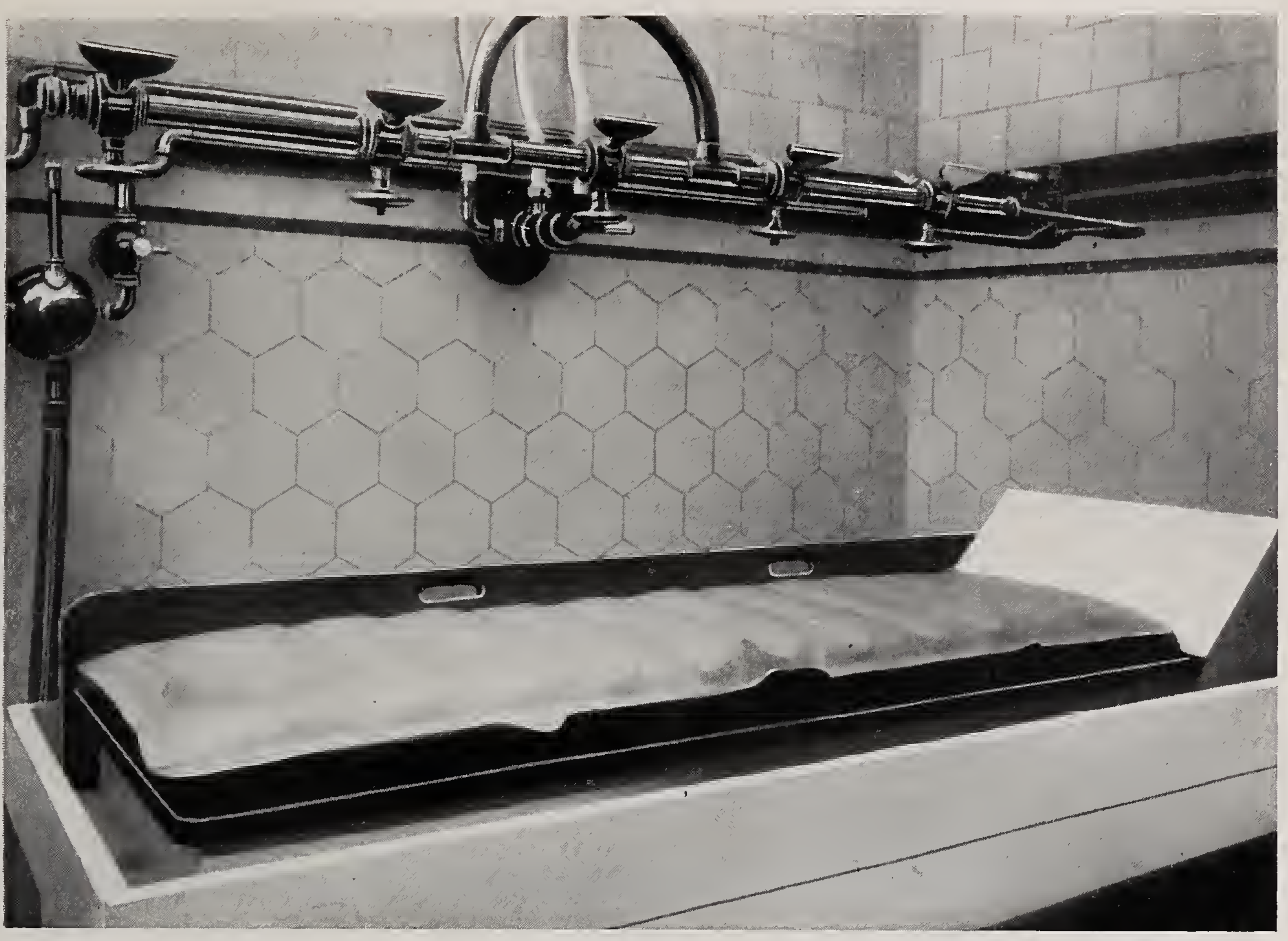


FIG. 87.—Vichy massage douche.

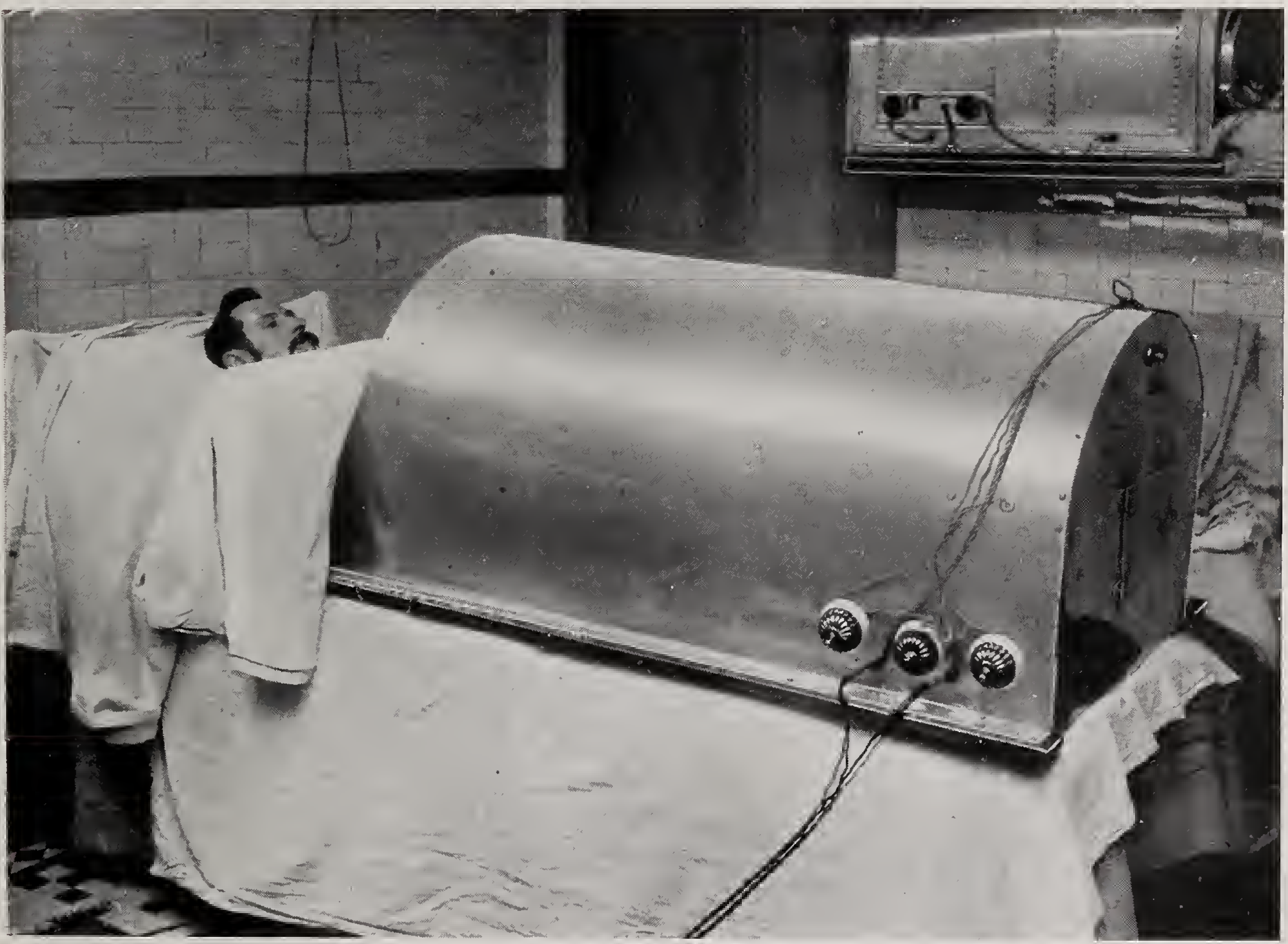


FIG. 88.—Greville bath. Whole body exposure.

To face page 426.

sary in cardiac diseases marked by *dilatation*, extreme degrees of which are inadmissible, as also the later stages of *chronic nephritis*.

On the other hand, they are eminently adapted for the treatment of fibrositis in *gouty* persons, especially those of *obese* habit, nor does the presence of *glycosuria* in such association constitute a bar to their use. The same beneficial results accrue in cases secondary to *dyspepsia*, with its attendant variable degrees of autotoxæmia.

Details of Technique.

These will vary according as to whether we wish to enlist their curative effect or adopt them as prophylactic measures. In the former case, where a profound eliminative and derivative action is desired, a more or less prolonged exposure is necessary—viz., twenty to thirty minutes.

In cabinets heated by steam or gas the temperature ranges from 120° to 200° F., but 180° F. usually produces profound sweating.

Diaphoresis can be stimulated by the free ingestion of water during the bath, and elimination is still further promoted by subsequent envelopment in warm towels or blankets.

In Greville baths, as in the former, the temperature should be gradually raised until perspiration ensues, usually from 200° to 250° F.

When sweating begins, the temperature should be maintained at this level for ten to twenty minutes, then slowly lowered. Greater heat can be endured by some without discomfort, but scorching may ensue unless the parts are adequately protected by asbestos lint or towelling.

Much the same procedure must be employed in the more modern Tyrnauer system, but, despite a certain superiority in equipment, our experience does not lead us to believe that they excel in actual therapeutic efficacy.

As before stated, radiant-heat or light baths do possess certain advantages over non-luminous varieties. Thus extreme heat is unnecessary, 110° to 130° F. often proving sufficient to incite perspiration. Sweating, indeed, appears quicker than in vapour, Turkish, Russian, or other non-luminous baths, and at lower temperatures.

If profuse diaphoresis is desired, the exposure should last fifteen or thirty minutes, and when, as often happens, the subjects are hyperæsthetic, we have found a substitution of blue for white incandescent lamps advantageous.

After prolonged baths for eliminating purposes, a *tepid or cold terminal procedure* is essential, either tepid sponging, an immersion bath at 90° to 85° F. for a few minutes, or a neutral douche or spray of the same duration. In these after-applications excessively low or abrupt changes are to be avoided, as otherwise in these "rheumatic" subjects their pain and stiffness will inevitably return with renewed force.

Many, indeed, are intolerant of even these mild measures, and we must fall back upon simple wrapping in a warm sheet thrown open from time to time to admit of evaporation. Others will submit to an immersion bath gradually lowered from 100° to 95° F. or less, provided it be combined with brisk friction.

Prophylactic Usage.

When enlisted for this purpose during convalescence, or in intervals of remission, short exposures only are needed.

Here, as Kellogg pointed out, they are invaluable as preliminary heating procedures in order to prepare the skin for the tonic effects of hypothermal or cold applications.

Brief in duration and of high temperature, they should, if properly administered, just stimulate the skin short of sweating, and a graduated cold spray or circular douche should instantly follow. If more convenient we may in robust subjects order a plunge bath of 70° to 60° F., or a short sharp douche of 60° to 65° F. for a few seconds.

In conclusion, it is the proper blending of their eliminative and prophylactic qualities according to individual needs that constitutes the keynote to rational treatment by hyperæmia.

Utilized intelligently after this fashion they are pre-eminently suitable for those victims of fibrositis who lead sedentary lives, as to a limited extent they counteract the evil effects of muscular inactivity.

Moreover, by the judicious use of graduated after-applications of cold or hypothermal grade, the undue sensitiveness of the skin is reduced, and a relative immunity from subsequent attacks is thereby attainable.

Peat, Mud, and Fango Baths.

Out of these various substances partially solid baths are produced, which vary in consistence from a semi-liquid to an almost solid mass. Various kinds of peat earth may be utilized—viz., saline (containing alkaline sulphides and earthy salts), ferruginous, and sulphurous turfs. Closely related in effects and uses are the so-called "mud baths" prepared from the slimy precipitates of various mineral waters and sea-water.

Their mode of action is partly mechanical, partly thermic,

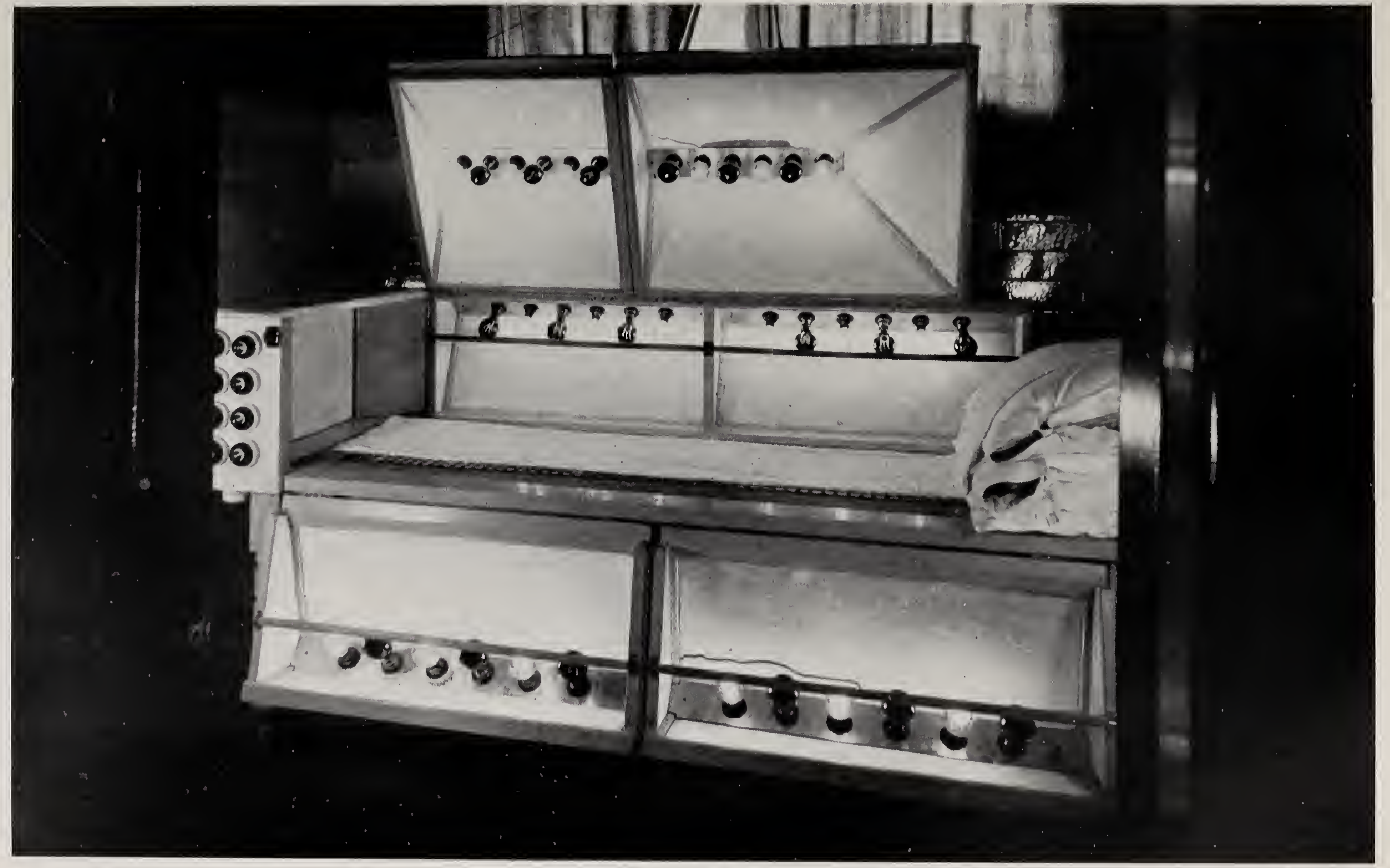


Fig. 89.—Incandescent-light bath.

To face page 428.

and possibly chemical, but the essential factor both in peat and mud baths consists in the varying degrees of *hyperæmia* they produce.

It must, however, be remarked that some of the mineral muds used are *radio-active*, and to this, in all probability, much of their well-established efficacy in "rheumatic" affections is attributable.

Used in conjunction with massage, hydrotherapeutic and dietetic measures, we have found them useful in the various types of fibrositis.

They are particularly beneficial in *neuralgic* affections, as well as in promoting *absorption of exudates, increasing mobility,* and *relieving stiffness* in periarticular and synovial forms of this disorder.

Whole-body baths of peat range from 98° to 112° F., with a duration of from twenty to forty-five minutes in individual cases. As in all thermal applications, in the subjects of fibrositis a terminal cold or hypothermal procedure is, when feasible, indicated.

The sulphurous mud baths at Acqui, Battaglia, and Postyen are given at a temperature of 104° F., and imported sulphuretted mud or fango is much in request in England for articular and neuralgic varieties of this affection.

Recently uranium mud or actiniferous earth, through emitting emanation of low activity in comparison with radium, has been enlisted for the making of mud baths (8 ounces to 49 gallons of warm water), and packs of radio-active earths have also been requisitioned.

In this connection, also, we should not overlook the timeworn use of *sand* baths. In these the whole body is immersed in sand heated to 110° or 130° F., and such are now available at Harrogate.

General Drug Treatment.

Only of recent years has the medicinal treatment of fibrositis emerged from the region of frank empiricism, but with the material alteration that has taken place in our conception of its etiology our principles of treatment bid fair to become more rational. In accordance with the view that in the majority of instances the condition is the outcome of an alimentary toxæmia or subinfection, our therapeutic efforts are directed towards—

1. Reduction or prevention of toxin formation.
2. The diminution of the degree of toxic absorption.
3. The speedy elimination through the various excretory channels of such noxious substances when formed.

We purpose in the first instance dealing with those examples of acute generalized fibrositis which pass often under the appellation of " influenzal " or " feverish " colds. Subsequently we shall proceed to discuss the treatment of the acute localized varieties, and finally that suitable for the chronic or recurring types of the same.

Acute Generalized Fibrositis.

The general malaise and pyrexia that characterize this usually very evanescent malady indicate clearly that it must be treated in accordance with the general rules applicable to febrile states.

Rest in bed is essential, while to control the production, absorption, and elimination of toxins, temporary fasting, or a suitable dietary with copious drinking of bland unirritating fluid, are indispensable preliminary measures. As adjuncts, though not as substitutes for such dietetic modifications, we should enlist the aid of drugs to insure adequate evacuation of the bowels, free action of the skin, and diuresis.

In dealing with such we have found the following mode of procedure very satisfactory. At the onset calomel, in doses of 2 to 3 grains, combined with a similar quantity of powdered ginger, should be given in the form of a pill, powder, or cachet, and followed in six hours or so by a seidlitz powder or saline purge. Concurrently, a diaphoretic mixture containing liquor ammoniæ acetatis, spts. ætheris nitrosi, with citrate or bicarbonate of potash, should be given every four hours. The profuse sweating thereby induced relieves very markedly the irksome painfulness diffused over the muscles, joints, and body generally.

Where the pains are very marked, aceto-salicylic acid in combination with phenacetin or Dover's powder hardly ever fails to relieve.

Defervescence is usually very shortly attained, sometimes in twenty-four hours, and for after-treatment all that is necessary is that we should carefully scan the patient's diet and mode of living, and where such predispose to gastro-intestinal derangement they should be revised accordingly.

Acute Localized Fibrositis.

Arthritic Types.

The influence of internal medication in these affections is very uncertain, and at best must be regarded as distinctly limited.

Too often causal indications are wholly lacking; and this being so, we have to proceed along general lines, while at the

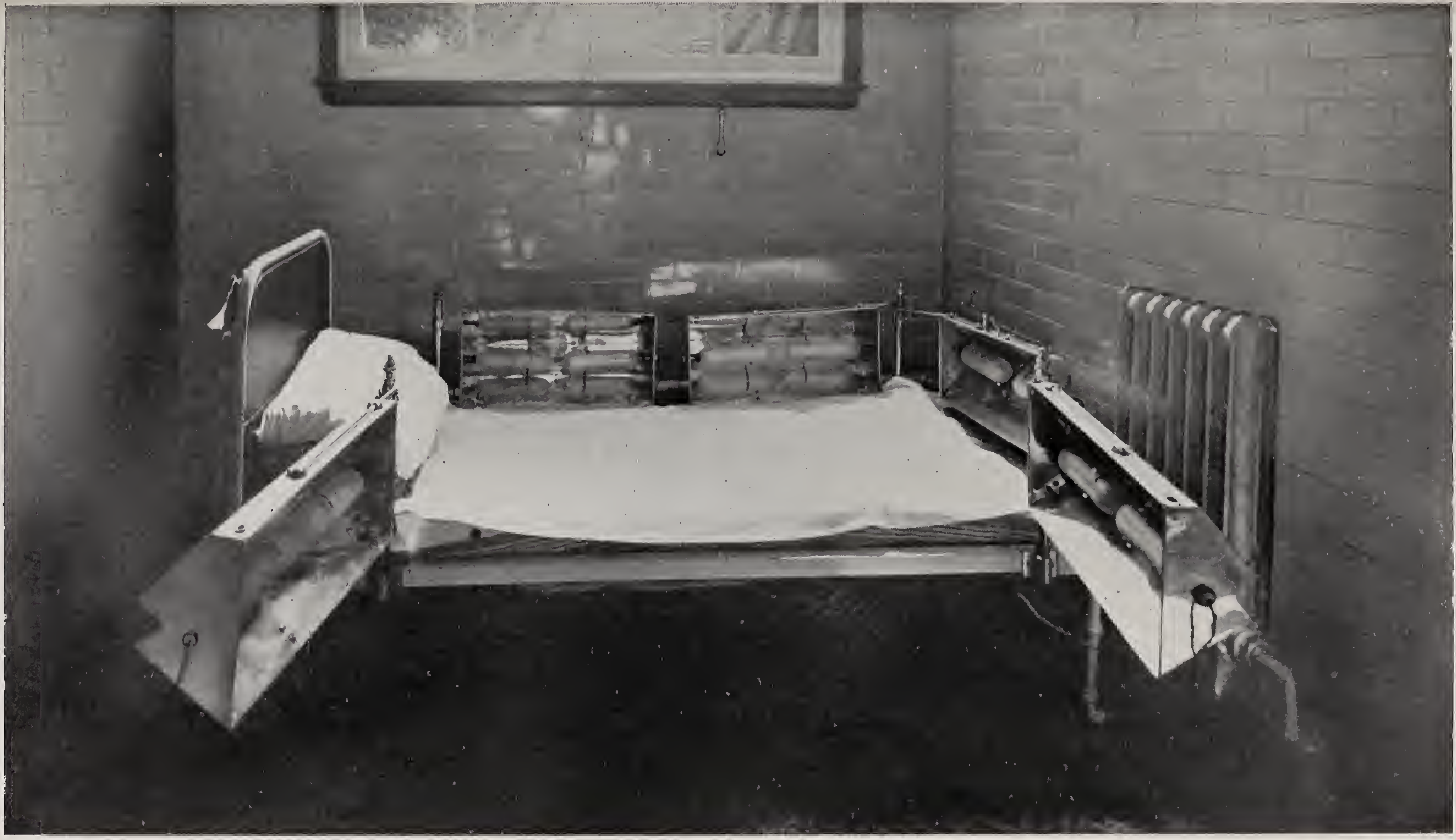


Fig. 90.—Dowsing or radiant-heat bath.

To face page 430.

same time being careful not to overlook any constitutional anomaly, whether gouty or otherwise, that may have a bearing on the case.

In those cases of periarthritis of probably infective origin, the onset, especially if several joints are involved, is usually attended by fever, and not infrequently they present, to begin with, a superficial resemblance to *acute articular rheumatism*. In such, a laxative followed by full doses of salicylate of soda sometimes affords relief, and the more acute the condition and the more pronounced the local symptoms, the more likelihood is there of the salicylates proving beneficial.

Still, but too often their exhibition is disappointing, and certainly no such specific effect is exerted as in acute rheumatism, a fact of some diagnostic significance.

Recently, however, Comstock, in a contribution to the *New York Medical Journal*, has advocated the *intravenous injection* of salicylate of soda on the plea that when administered by this route the drug acts more efficaciously than when taken orally.

He has obtained considerable success not only in the treatment of refractory forms of acute articular rheumatism, but also in acute and chronic muscular rheumatism.

He uses the following prescription:

℞	Guaiacol. sodii salicylatis Glycerini	.. āā 640 grains.
	Aq. destill. et steril. ..	.. 2000 c.c.

The patient being suitably prepared and an aperient given, 250 c.c. of the solution at a temperature of 110° to 110° F. is slowly passed into the vein.

The first manifestation of its effect is a tingling sensation, while the absorption of the guaiacol is attested by a coal-tar taste in the mouth, and, in addition, there supervenes a more unpleasant symptom—slight delirium—which may last half an hour.

The face becomes congested and suffused, perspiration breaks forth, pain is strikingly relieved, and within twenty-four hours the patient is better.

In view of the fact that the class of joints now under consideration, viz., the *undifferentiated infective arthritides*, prove so often refractory to salicylates administered orally, it is at least possible that a trial of the intravenous route might prove more effectual.

In many of these so-called toxic or septic forms of arthritis the temperature remains raised for weeks or months, and anyone who has had charge of such cases will readily agree as to the hopelessness of any attempt to influence their course by salicylates or any other known drugs when given by the mouth. In *muscular rheumatism* the results have not proved so encouraging, and in chronic forms two or three injections may have to be given at intervals of three or four days; but, fortunately, these muscular types usually respond very swiftly to salicylates as taken in the usual manner.

When, as often happens, the case proves obdurate to the salicylates or aspirin, their combination with sulphate of quinine has often in our hands proved more satisfactory, and where the febrile stage is prolonged the last-named drug will prove the most serviceable.

If pain be notably severe, and the urine highly acid with a copious deposit of lithates, the possibility of a *gouty* substratum will have to be entertained. In that case the following prescription, rendered, if preferred, effervescent by the addition of a few grains of citric acid to each dose, may swiftly abate the intensity of the suffering:

℞ Potassæ bicarbonatis	10 to 15 grains.
Potassæ nitratis	10 ,, 15 ,,
Vini colchici	10 ,, 15 minims.
Aquam	to 1 ounce.

Sig.: To be taken three times a day.

The pain in these cases may be very intense, and while we should at all times depend as far as possible on local measures, dry heat and so forth, for its mitigation, yet in some instances resort to nightly doses of Dover's powder or a hypodermic injection of morphia, is unavoidable.

The foregoing constitute the outlines of treatment in the acute stages; and this being tided over, the further therapy is identical with those of subacute or chronic nature, to which we shall refer later.

Muscular Types.

The general lines of treatment are precisely similar to those advocated for the articular variety, but the response to internal medication is usually more swift and certain.

A preliminary hot or vapour bath given at the very onset is certainly a most powerful adjunct, and our subsequent measures should be directed towards free elimination by bowels, kidneys, and skin.

Purgatives are frequently of great service in the different forms of muscular fibrositis, more particularly lumbago, and they should always precede the use of other remedies.

For acute cases of *lumbago* are often marked by considerable functional derangement, with high-coloured urine and dark, offensive fæces. In such cases it is well to give 3 to 4 grains of calomel at night, followed in the morning by a saline purge or a black draught. It is often necessary to repeat it once or twice during the first week, after which it will suffice if we regulate the action of the bowels, and if necessary give rather a brisk purgative every few days until convalescence is established.

Or we may enlist the following prescription, which we have for many years found most reliable, and it has the advantage of being eminently suitable in those cases where expense has to be considered.

℞ Magnesii sulphatis	1 drachm.
Potassæ bicarbonatis	15 grains.
Spiritus ætheris nitrosi	30 minims.
Tinct. hyoscyami	30 ,,
Aquam	to 1 ounce.

Sig.: To be taken every four hours.

We have emphasized the frequency with which the subjects of lumbago are gouty, and where the symptoms do not speedily remit, the addition of 5 to 10 minims of colchicum wine to each dose of the mixture rarely fails to give the desired relief.

In instances where the functional derangement is less marked and the pain is more of a *neuralgic* character, the following is an excellent formula, to which, if necessary, colchicum also may be added:

℞ Sodii salicylatis	1½ drachms.
Potassæ citratis	1 drachm.
Tinct. gentianæ co.	4 drachms.
Aquam chloroformi	to 6 ounces.

Sig.: One tablespoonful every four hours.

At the same time the bowels should be regulated by prescribing pil. coloc. cum hydrarg. at bedtime twice weekly, followed by a morning draught of some aperient, such as Condal or Arabella water, to obviate any toxic symptoms that may result from the colchicum.

Where the case shows a disposition to linger on in a subacute form, and the urine still remains charged with lithates, a mixture of nitrate of potash, spirits of nitrous ether, and infusion of buchu, should be given thrice daily. We may add, too, that in broken-down subjects with sluggish circulation we have found the addition of a few minims of tincture of digitalis most helpful in clearing up the condition.

Acute forms of *torticollis* rarely fail to relent speedily to salicylate of soda or aspirin, given in adequate doses every four hours, and the same is true of *pleurodynia ;* but in some cases of the latter, which have come under our direct observation, the subsidence of the attack has been the signal for an outbreak of *acute articular gout in the great toe.* This significant sequence indicates the necessity of being alive to the possibility of a gouty basis in such cases, and the advisability of combining colchicum with our remedies.

Acute brachial fibrositis is of all types of this class the most difficult to treat, owing to the marked tendency to prolongation of the acute stages. The only chance of aborting such an attack is not to treat lightly its earliest manifestations, but to bear in mind its unpleasant potentialities. Only too commonly they do not come under observation until the condition is well established, and then the salient point to keep before us is their almost invariably *gouty* nature. When confronted with the disease at this stage, it is well worth trying the following combination:

℞ Quin. hydrochloratis	½ drachm.
Pot. iodidi	2 drachms.
Vin. colchici	1 ounce.
Tinct. aurantii	2 ounces.
Aquam chloroformi	to 8 ,,

Sig.: Two teaspoonfuls in a wineglass of water twice a day.

Having regard to their frequent gouty origin, it is hardly necessary to insist on the regular and adequate evacuation of the bowels by alkaline salines, aided by an occasional mercurial pill.

Gowers, who has written so illuminatingly on this particular variety, found the best results in the early stages from a combination of nitrous ether, citrate of lithia, and colchicum, with small doses of perchloride of mercury in the more intense forms. To the salicylates, salicin, and aspirin, he accords but tepid praise, and, though at times useful, we have ourselves known them afford but little relief.

In *abdominal types of fibrositis* seen in the acute stages the same preliminary purgation, followed by administration of salicylates or aspirin, with or without colchicum, is the most satisfactory course to pursue.

As to the *relief of pain* in these acute types of muscular fibrositis, we would insist on internal medication of all sorts being held as purely secondary to the infinitely more important matter of procuring *rest for the inflamed structures.* Immobilization, indeed, supplemented by thermic and anodyne applications, hardly, if ever, fails to mitigate the suffering. If these prove futile, aspirin, phenacetin, or pyramidon, either singly or in combination, should be exhibited, and only very exceptionally in our experience are narcotics like morphia called for.

If at all, it is in *brachial fibrositis* that the necessity usually arises, and here, particularly in elderly people, we have found great advantage from the exhibition of small doses of opium. It is preferably given in the form of 5 to 10 grains of Dover's powder at bedtime, and acts not only as an anodyne and sudorific, but it appears to render the urine less acid. Properly supervised, we have seen no ill results accrue, provided steps be taken to combat its tendency to produce constipation.

Neuralgic Types.

In those cases of *acute* onset with which we are now concerned, a history of exposure to damp or overexertion is common, and the subjects usually fall under a gouty or so-called "rheumatic" category. If seen sufficiently early, and certainly when there are febrile symptoms, diaphoretic measures in conjunction with a mercurial purge and alkaline diuretics should be resorted to vigorously, so as to abort, if possible, the attack.

Recent neuralgias, indeed, may rapidly yield to such internal medication, especially if exhibited in conjunction with a hot immersion, vapour or Turkish bath, followed by packing. But if the disease is in any way established, the movements of the limb, unavoidable during the latter procedures, almost infallibly aggravate the pain. Under these circumstances, therefore, a hot blanket pack or dry heat causes less disturbance of the limb, and may with advantage be enlisted to augment the effect of internal diaphoretics.

Oppenheim, when dealing with the treatment of sciatica at its *initial* onset, emphasizes the importance of *diaphoretic measures*—a vapour bath followed by a pack—deeming them especially valuable in "rheumatic and infective types." Also, when from the severity of the pain and local tenderness, attended by sharp pyrexia, there be reason to suspect an incipient neuritis, the same procedures offer the best chance of speedy amelioration.

Evacuation of the bowels at the onset is essential, and is especially called for in sciatica, when there is any evidence of *pelvic or portal venous engorgement.* Moreover, the extreme frequency with which sciatica and brachialgia are allied to a *gouty* diathesis emphasizes the importance of adequate purgation by salines. Attention, indeed, to this point alone will sometimes cut short an attack, and where there is habitual constipation the success of treatment will largely depend upon how far such faulty habits admit of correction.

Apart from this, all will depend upon how accurately the physician has gauged the *underlying constitutional anomaly.* If the condition be of gouty origin, alkaline diuretics and colchicum are indicated; but in so-called "rheumatic" examples the salicylates, particularly aspirin, seem more effectual.

The presence of *sugar in the urine* will, of course, supply its own indications for dietetic revision. When a definite history of *syphilis* is forthcoming, there should be no delay in resorting to antispecific treatment, and this even though the affection may appear adequately accounted for by exposure or some other exciting cause.

In young men we should be specially alive to the possibility of *acute gonorrhœa*, which of course demands thorough local treatment.

Apart from the correction of constitutional or specific causes, we have to achieve the *relief of pain*, which in these acute cases is always urgent. If rest and local thermic applications have failed, we may resort to the various antineuralgic drugs, none of which, however, can absolutely be depended upon. Indeed, their exhibition is almost always of the nature of an experiment, and there is also the fear of toxic poisoning to be borne in mind.

Of such analgesic remedies there are an infinite number, but certainly in our experience aspirin is the most reliable, and the least likely to give rise to unpleasant symptoms. Next to it come phenacetin, salicylate of quinine, and pyramidon, and in cases where no constitutional or diathetic taint is detectable and the neuralgia is apparently idiopathic in nature, gelsemium is worthy of trial.

Sometimes these drugs succeed better in combination, and we ourselves favour aspirin and phenacetin, with or without quinine, or Dover's powder. Harburn recommends the following: Aspirin, 0·4; phenacetin, 0·3; salicylate of quinine, 0·1; and codeine, 0·015 to 0·03; while recently for sciatica Bruce has advocated as a "useful prescription" a mixture of morphia, salicylates, bromide of potassium, and chloral.

Personally, however, when a case is so bad as to need narcotics, we prefer to employ the subcutaneous injection of morphia, and advisably, we think, at the actual site of pain. But it is certainly wise to defer its adoption as long as possible, and in all cases it should be administered by the physician himself, and not entrusted to the patient or his relatives. Neglect of these precautions has, from our own observations, been fraught with the most lamentable results.

Judging by experience gained at the Royal Mineral Water Hospital, Bath, and elsewhere, hypodermic medication with morphia is only very exceptionally needed, if care has been taken to insure immobility of the limb, conjoined with the intelligent and persevering employment of thermic and counter-irritant applications.

Where muscular twitching and spasm are troublesome features, atropine may be combined with morphia, or, where there is any intolerance of the latter, it may be used alone.

Such in brief are the outlines of treatment suitable for the acute stages of nerve fibrositis, and we shall now pass on to discuss the methods of drug-therapy applicable to chronic or recurring forms of fibrositis.

Chronic or Recurring Forms.

Our remarks on the treatment of these more obstinate forms of fibrositis may well be prefaced by the truthful, if somewhat depressing, statement that there are no specific remedies at command.

This, however, while it condones, does not absolve us from at any rate attempting to blend our empiricism with some degree of rationalism. The surest road to its attainment, we need hardly remark, is the laborious one of careful physical examination, combined with a searching analysis of symptoms as well as the personal and ancestral history. By this means we may haply be able to refer the excessive formation of fibrous tissue to some specific cause—it may be *diabetes*, *syphilis*, *gonorrhœa*, *influenza*, or, more particularly in the case of the *nerve* types of fibrositis, we may be able to establish their *secondary* nature. The detection of such, of course, brings its own reward in the shape of clearer and more definite indications for treatment.

More commonly, however, the existence of *acquired or ancestral gout* will supply the clue to rational therapeutics, and failing this we may provisionally have to ascribe the disorder to an *alimentary toxœmia or subinfection.* Under such circumstances, of course, our manifest duty is to mark any deviation from a condition of health that may be present, in the hope that through its correction we may possibly influence the hidden cause which is responsible for the development of the affection.

Far too commonly, in our haste to relieve pain, we are apt to overlook the indications for causal treatment in the shape of some gastro-intestinal or hepatic derangement, evidences of which are rarely lacking in subjects of chronic fibrositis.

In other words, therefore, in all these cases, whether of gouty or autotoxic origin, our first endeavour should be to treat rationally any digestive disorder, while at the same time promoting hepatic and renal activity as well as adequate evacuation of the bowels.

Correction of the Disorders of Digestion.

When acidity is a prominent symptom, a combination of magnesia, soda, ammonia, and rhubarb will correct the tendency, especially in those of gouty habit.

If the symptoms are rather those of atonic dyspepsia, alkaline bicarbonates with nux vomica and vegetable bitters should be ordered thrice daily before meals.

In some gouty subjects of fibrositis, usually of pallid colour and sedentary habits, dilute hydrochloric or phosphoric acid in a bitter infusion seems to succeed better than alkalies.

Promotion of Hepatic and Renal Activity.—If the liver be sluggish, an occasional blue pill or calomel with small doses of the acetic extract of colchicum should be given at bedtime, followed by an alkaline saline purge on rising. When the stools are dark and offensive, mercurials may be replaced by podophyllin, or, if the latter proves irritating, euonymin or iridin may be substituted.

In addition to the foregoing measures, we should, for the purpose of promoting renal excretion, see that the patient partakes freely of hot or cold water, which may advantageously be given after each dose of the alkaline mixture.

Correction of Abnormal Fermentative and Putrefactive Processes.—Apart from the foregoing gouty subjects, many of the victims of fibrositis suffer from amylaceous dyspepsia with acid fermentation. In this event the following measures, though always subsidiary to dietetic modifications, are distinctly helpful.

In addition to alkaline and stomachic mixtures before meals, diastase, 1 to 5 grains, or taka-diastase, 1 to 2 grains, may be taken in cachet form directly after meals. When more direct attempts at sterilization seem called for, the occasional administration of minute doses of calomel ($\frac{1}{10}$ to $\frac{1}{8}$ grain) is highly efficacious, if given every two hours until 1 grain is reached.

Such intestinal indigestion, as Stockman says, is commonly in evidence in lumbago, and he advises a course of mild purging—2 or 3 grains of grey powder, blue pill, or compound rhubarb powder at bedtime, followed by a morning saline.

With regard to these as well as other intestinal antiseptics, such as beta-napthol and its salicylates, etc., it cannot be too strongly emphasized that they are absolutely futile, unless supplemented, if necessary, by regular and thorough evacuation of the bowels.

Elimination of Toxic Products.

Chronic *constipation* is present in almost all cases of fibrositis, and its correction, though often overlooked, is imperative. Many subjects of fibrositis, indeed, comment upon the relative immunity they enjoy when a regular action is established, and there is no doubt that the overcoming of constipation is the clue to successful treatment in most of these cases. We may ring the changes upon one of the many laxatives now available, such as confection of senna or sulphur, liquid paraffin, or phenolphthaleïn. But for ourselves we find better results follow the use of sulphate or phosphate of soda, or some aperient water such as Condal, Arabella, or Apenta.

To secure more thorough cleansing of the bowels, high enemata or a course of Plombières douches should be resorted to in obstinate cases.

Before leaving this all-important question of constipation in chronic fibrositis, we would record a plea for a more routine employment, in obstinate cases, of X-ray illumination of the gastro-intestinal tract. For more commonly, perhaps, than is at present realized are there to be found in these states of alimentary toxæmia displacement of the colon with delayed transmission of its contents. The knowledge gained by skiagraphy as to the site of intestinal stasis will enable us to supplement or replace purgation by intelligently-applied massage.

In the same way in *visceroptosis*, systematic exercises, Swedish gymnastics, and abdominal supports will do much to restore regular habits of constipation. The foregoing constitute the lines of rational treatment in chronic fibrositis, our aim being to correct functional derangement, to control abnormal fermentative processes, and to promote speedy elimination of their toxic products.

Drugs empirically administered.

Certain drugs, traditionally held to possess the power of influencing a gouty or rheumatic diathesis, still remain for brief consideration. The chief of these are the iodides, guaiacum, arsenic, and sulphur. With regard to the iodides, opinions vary greatly as to their capabilities of influencing the morbid process. Fuller, for example, believed them to be useless in muscular fibrositis, but distinctly valuable in *arthritic* and *periosteal* varieties. As opposed to this, Graves, in his own person, was much impressed by the effects of potassium iodide in acute lumbago.

Personally, we are inclined to believe that the good results obtained vary in accordance with the etiology of the particular example, these being more pronounced in the presence of a gouty element. In *muscular* types the chief benefit of course is experienced, during the comparatively early stages, before organization of the inflammatory products is completed.

The same is true in regard of *neuralgic* types, and in both instances their administration is useless when the nodules or indurations have become hard and resistant.

Similarly, in *joint* types, their beneficial effects are more marked in the presence of swelling and intrasynovial effusions, much less so when the capsule or synovial membrane has undergone thickening.

Frequently they appear to act more efficiently, especially in muscular types, when combined with *guaiacum.* With regard to the last-named drug, it is interesting to note that experimental researches recently conducted by Martindale and Westcott distinctly confirm Garrod's contention that this drug reduces the amount of uric acid excreted.

Its exhibition is especially useful in gouty subjects who suffer with intestinal torpor and inactive skin. Its good effects, we believe, are largely, if not wholly, attributable to its aperient action, as if given in inadequate doses it seems to exert no special influence. It appears for some reason to mitigate muscular pain and stiffness, and for this purpose we have for years employed guaiacum, in the form of resin, tincture, or powder, in combination with sulphur. A particularly useful formula is one compounded of guaiacum, sulphur, and bitartrate of potash, this being prepared with a little powdered tragacanth and administered in doses of ½ to 1 teaspoonful taken in water at bedtime.

In gouty subjects whose bowels act regularly, whose urine is clear, though of low specific gravity, arsenic may advantageously be substituted for the sulphur in these muscular types of fibrositis.

Fothergill speaks highly of the following prescription, and out of our own experience we can fully confirm him as to the efficacy, especially in chronic or oft-recurring lumbago:

℞	Ac. arseniosi	3 grains.
	Pulv. guaiaci	3 drachms.
	Pulv. capsici	½ drachm.
	Pil. aloes et myrrh.	3 drachms.

Divide into 120 pills. One twice a day.

Sulphur, even by itself, enjoys a well-established reputation, not only in treatment of the muscular, but also of the neuralgic types. It may be taken in the form of a tabloid three times a day, or a teaspoonful of the confection of sulphur may be taken night and morning. It forms also an important ingredient of the so-called "Chelsea Pensioner," which, however, in its original form was a most unpalatable preparation. Prepared in the form of tabloids or cachets, we have extensively used it. It is of the greatest service in long-standing cases, but whether the good results obtained are referable to any specific action or to its laxative effect is uncertain.

Quite recently Maillard has reported good results from the administration of colloidal sulphur, 2 teaspoonfuls daily, increased up to 2 tablespoonfuls. More than this amount excites diarrhœa. In this form it is rapidly and entirely absorbed by the digestive tract, a striking advantage having regard to the comparative insolubility of free sulphur. Frequently in obstinate or inveterate cases the addition of colchicum to the foregoing preparation seems to enhance its beneficial action.

In conclusion, it must be admitted that much remains to be done before we can claim to possess satisfactory medicinal treatment for the various forms of chronic rheumatism.

We have not attempted a comprehensive survey of all the multifarious drugs advocated, but have merely referred to those of which we have personal experience.

Serum and Vaccine Therapy.

Though the treatment of chronic rheumatism, or fibrositis, according to these methods is yet in the experimental stage, some of the results recorded seem to indicate that possibly in the near future they may prove a useful adjunct to, though not a substitute for, other modes of therapy.

By way of prelude, it will be advisable to indicate briefly the general principles on which passive immunization, or serum therapy, and active immunization, or vaccine therapy, are based.

Principles underlying Passive and Active Immunization.

Every infection of an organism immediately brings into play complex defensive or protective mechanisms—the antibodies—which are concerned in the establishment and preservation of immunity against the invading bacterium. In other words, the elaboration of antibodies has for its aim and end either the destruction of the hostile microbe, or, failing this, the neutralization of its toxic products.

The poisons generated by the bacteria are divisible into two classes: those formed within the bacterium itself—*endotoxins*—and those matured in the tissues outside the bacterium—*exotoxins*.

In this war between the bodily forces and the invading microbes the defeat of the organisms may be achieved, as it were, by direct assault, through the agency of a particular type of antibodies called "bacteriolysins." Or their annihilation may be compassed, so to speak, by means of a flank attack, brought about by enlisting the aid of the phagocytes, whose increased production is stimulated by another variety of antibodies—the "opsonins."

Lastly, the control may be decided by resort, as it were, to disarmament of the enemy, whose lethal weapons—the exotoxins—are blunted or neutralized by a third species of antibodies—the "antitoxins."

Now, in those disorders in which the characteristic symptoms are due, in the main, to the production of endotoxins by the causal organism, the ideal plan would be to achieve the destruction of the poison-forming microbe by means of a bactericidal serum—viz., one richly endowed with bacteriolysins. Such sera, as we know, are produced by the inoculation of horses with living or defunct microbes, and in this way, for example, antistreptococcal and antipneumococcal sera are procured; but, unhappily, the results obtained by their use in these types of infection are somewhat disappointing.

But in those infections in which the responsible poisons are of the nature of exotoxins, their neutralization is effected by means of *antitoxic sera*, of which the classical example is furnished by antidiphtheritic serum.

In regard of the destruction of the bacteria by enhanced phagocytosis through the agency of opsonins, no definite conclusions are possible, owing to our uncertain powers of determining the *opsonic index*, which is now chiefly used as an aid to diagnosis and a guide to both prognosis and treatment.

As before stated, bactericidal sera have not in practice proved effectual, and this being so, we attempt to secure the destruction of the endotoxins *indirectly*—viz., by *vaccine-therapy*.

This method consists in the introduction into the body of dead bacteria, whose presence has the effect of enhancing the formation of antibodies, which neutralize the endotoxins.

Serum-Therapy in Chronic Articular Rheumatism.

We have in our etiology hazarded the view that there may yet be established some affinity, bacteriologically speaking, between *acute articular rheumatism and the articular varieties of chronic rheumatism*, and a brief digression regarding the bacteriology of the acute type will, we think, be profitable.

Now, in the latter, despite the obscurity that enshrouds its exact etiology, we may at least affirm this much: that the organism most frequently found in this disorder belongs to the group known as *streptococci*. Unhappily, the *Micrococcus* or *Streptococcus rheumaticus* has hitherto been found incapable of differentiation from the *Streptococcus pyogenes*, though the clinical phenomena of acute rheumatism are of distinctly specific character.

In *acute* rheumatism, germs have been isolated from the tonsils, the blood, and the joints, and the frequency with which the disorder is preceded by streptococcal tonsillitis naturally led to the tonsil being a preferential site from which to obtain organisms for the production of sera. Cultures obtained from this region were inoculated into animals, and in this way *Menzer's serum* for the treatment of acute articular rheumatism was produced, while other antirheumatic sera have been elaborated from organisms derived from the actual joints.

Now, the results of their administration in acute articular rheumatism are very uncertain, and Poynton suggests that this may, in fact, be attributable to the rapid loss of virulence on the part of the *Micrococcus rheumaticus*.

Their employment is chiefly indicated in the graver forms with a marked degree of sapræmia, though their use is contra-indicated in cases marked by hyperpyrexia, pericardial and pleural effusions, as well as stenosis of the cardiac orifices.

Menzer advises subcutaneous injections of 5 c.c. every two or three days. After a series of five to six injections, a considerable interval should elapse before resumption, and especially in cases marked by intense general or local reaction.

Here we would draw attention to the fact that the most severe type of *chronic* articular rheumatism—*le rhumatisme chronique fibreux* of Jaccoud—has frequently been observed to develop out of a series of attacks of acute articular rheumatism.

It is, therefore, interesting to note that some of the most beneficial results that followed the exhibition of *antirheumatic* sera have been recorded in regard of *recurring or subacute attacks of acute rheumatism.* Now, inasmuch as these sera avail nothing in cases marked by extensive fibrous thickening of the joint capsules and related structures, we would suggest that, by a timely resort to Menzer's serum in recurring attacks of acute articular rheumatism, its evolution into the graver type, *le rhumatisme chronique fibreux*, might be obviated.

So much for the results of serum-therapy in acute articular rheumatism and the possible prophylactic influence it might exercise on the development of that particular type of chronic rheumatism associated with the name of Jaccoud.

We would now pass on to consider, from this same therapeutic aspect, that very much larger class of disorders grouped under *chronic articular rheumatism*—the undifferentiated types of infective, toxic, or septic arthritis.

As before pointed out, the organisms most commonly found in *acute* articular rheumatism are of the *streptococcal* species, and it is significant that, not only in the arthritic, but also in the muscular varieties of *chronic* rheumatism, bacteriological investigation, both clinical and experimental, has clearly shown that here, too, the causal organisms are *streptococci of varying, though often attenuated, degrees of virulence.*

Now, before we can embark on a course of serum or even vaccine therapy, we must, if possible, identify the causal germ, as otherwise ideal treatment by these methods is out of the question.

In this connection, it is to be borne in mind that these *un-*

differentiated forms of infective arthritis betray a distinct inclination to *acuteness in onset,* and are at this stage liable to be confused with *acute articular rheumatism,* as well as with acute and non-purulent types of arthritis of *pneumococcal, gonococcal,* or *streptococcal* origin.

If, therefore, we aim at rational as opposed to purely haphazard serum or vaccine therapy, we must effect a differential specific diagnosis in a *bacteriological* sense.

Differential Specific Diagnosis.—Bearing in mind the uncertainty that attaches to the identity of the causal organisms in *acute articular rheumatism* we are compelled in its instance to rely on the distinctive features and course of the disorder to enable us to effect its diagnosis.

In regard of the *pneumococcal* type, in which in the early stages the effusion may be non-purulent, the diagnosis will be made from the clinical picture, the especially marked leucocytosis, and the detection of organisms in slides, and, failing this, the results of animal inoculation with the sputum. But it should always be borne in mind that, even if pneumococci are present, they may not be etiologically responsible; for they have a tendency to localize themselves in joints, the seat of previous chronic infection.

To differentiate those of *gonococcal* origin, examination by Gram's method of the smears obtained from genito-urinary secretions will be indicated, or cultivation of the organisms; and where there is difficulty in demonstrating their presence by these methods, serum diagnosis is called for.

The foregoing specific types of infective arthritis having been excluded, we have still to bear in mind the possibility of a *streptococcal* infection. In this connection, we should be especially alive to the presence of slight wounds or abrasions, with associated involvement of lymphatics or glands, while at the same time not overlooking the possibility of a streptococcal infection of the tonsils.

To establish our diagnosis, we must, then, seek to demonstrate the presence of streptococci, either by means of cultures obtained by inoculation of media with organisms derived from the joint fluids, or, if the infection be of tonsillar site, by the staining of specimens isolated from smears.

Now, when we are confronted with an acute and fulminant arthritis of this nature, the exhibition of antistreptococcic serum such as Menzer's is indicated; for the urgency of the symptoms demands this more speedy method of influencing the course of the infection

Needless to say, too, if there be any local focus, in the throat or elsewhere, that admits of local treatment, it should form an essential preliminary or accompaniment to serum administration.

It is not, however, with these fulminant and happily rare types of infective arthritis that we are chiefly concerned, but with those *undifferentiated subacute* and *chronic* varieties of infective arthritis which constitute the bulk of the joint-disorders, classed under the term "chronic articular rheumatism."

As opposed to the most acute forms, in which the *Streptococcus pyogenes* may be present, in these more subacute and chronic forms the organism most commonly found is the *Streptococcus salivarius* or *Streptococcus fœcalis*, which is of attenuated virulence, and does not cause suppuration.*

Not uncommonly, also, in the Royal Mineral Water Hospital, Bath, *diphtheroid* organisms have been isolated from the vagina or cervical canal. In other instances *coliform* bacilli seem to have been responsible, and it is probable that the *influenza* bacillus may account for some of the examples of this variety of arthritis.

Their clinical phenomena and diagnostic features have been fully considered under the title *periarthritis*, and though at their onset they display a tendency to acuteness, they quickly assume a subacute or chronic form, which renders them especially favourable for the exhibition of vaccine-therapy.

Treatment of Local Foci of Infection a Necessary Preliminary to Vaccine-Therapy.

If there be, however, any infection so situated as to admit of radical measures, these should be undertaken prior to resorting to vaccine-therapy.

The usual surgical procedures called for are the cleansing of the mouth, removal of septic or carious teeth, local treatment of aural or nasal discharges, excision of polypi or tonsils, uterine curetting, and the healing of rectal ulcers, etc.

There is, however, the drawback that the performance of any of them may determine an exacerbation of the arthritis, the patient absorbing a fresh dose of infection at the newly-formed raw surface—an untoward consequence of which we have had experience.

As a *prophylactic* measure, it is well to secure before operation as thorough a cleansing of the parts as possible, and in this way to diminish the chances of infection or toxic absorption. Or, with the same end in view, as Horder suggests, we may exalt the protective powers of the individual by previously inoculating him twice or thrice with the particular vaccine indicated in his case.

---

* In this connection, too, it must be recognized that Rosenow's researches distinctly suggest that a large number of acute and chronic forms of arthritis are referable to the group of cocci isolated by this observer. These streptococci, though ordinarily non-pathogenic, under certain conditions—viz., if located in deep tonsillar crypts, decayed teeth, etc.—develop pathogenicity, and from these foci infect the joints (*vide* Etiology).

But, as Horder emphasizes, this use of the vaccine is a purely prophylactic measure, as opposed to its subsequent invocation as a curative agent.

Now it not infrequently happens that a swift amelioration follows radical treatment of the local foci, and in such cases we have not found it necessary to resort to vaccine-therapy.

If, however, notwithstanding local treatment, the joint disorder at the end of a week or two appears *in statu quo*, then we must supplement our surgical procedures by embarking on a course of auto-vaccines.

Vaccine-Therapy.

The basal principle of this therapeutic method resides in the fact that, by the introduction of vaccines into the bodily tissues, we can stimulate the formation of specific antibodies.

Now, a *bacterial vaccine* is a suspension in a normal saline solution of a pure culture of any micro-organism, this being sterilized by heat, and standardized to contain a definite number of bacteria in a cubic centimetre. Their effect is invoked, not only for the direct treatment of subacute and chronic infections, but also for prophylactic or protective immunization, which aims at the prevention of the development of the disease.

Bacterial vaccines are divisible into two kinds—*stock vaccines* and *auto-vaccines.* The former or heterogeneous variety are those drawn from sources outside the patient himself. They may be of "mixed" nature, consisting of the various species of bacteria causing infection, or "polyvalent," in which divers species and strains of organisms are incorporated. As opposed to this, an autogenous vaccine is one prepared from organisms isolated directly from the patient himself.

Now, as to their comparative advantages, it may be remarked that the chief argument adducible in favour of stock vaccines is that they are always at hand, and can be more swiftly brought into action than autogenous vaccines. But, as the varieties of infective arthritis now under consideration are more frequently of a *subacute* or *chronic* type, there is no urgent haste, and consequently *autogenous* vaccines should always be preferred.

But while it is in principle well to avoid the use of stock vaccines, still, if we are fortunate enough to see these cases at their initial onset, when the symptoms are most acute, then we may, with the aim of swiftly influencing the case, have recourse to stock vaccines, pending the manufacture of one of autogenous kind.

Now, obviously, for the success of vaccine-therapy, it is essential that an accurate bacteriological diagnosis of the case under consideration be accomplished, which, of course, is comparatively easy if we are able to isolate the particular organism by direct cultural experiment.

But frequently in these cases of so-called " chronic rheumatism " this is not possible, and the identity of the causal microbe has to be determined by the phagocytic and opsonic reactions of the patient's serum to the isolated organism, and the lesions noted in animals as the result of its inoculation.

Working along these lines, Goadby prepared autogenous vaccines from *streptococci* obtained either from local foci when present, or from the urine or fæces, and their subsequent injection was followed by improvement in these types of arthritis.

We see, therefore, how closely allied bacteriologically are these subacute and chronic varieties with the *acute forms of streptococcal arthritis* previously described. At the same time it is clear that, while the responsible organisms in the majority of instances belong to the streptococcal species, they are made up of different *strains*, whose special and specific action explains the varying clinical characteristics presented by the acute, subacute, and chronic varieties respectively.

This being so, it is obvious that the exhibition of stock vaccines must always, in the results attained, be inferior to those procured by the administration of autogenous vaccines.

Control and Spacing of Autogenous Vaccines.—In the case of an auto-vaccine it is always well to begin with *small* doses; for, although the numerical content of bacteria in a cubic centimetre is known, the degree of virulence of the organisms is unknown.

If the infection be at all *acute and generalized*, as betokened by the large number of joints involved, small initial doses are here again indicated; but if localized to *one* joint, and of long standing, there need be less apprehension on the score of excessive dosage.

In this as in all other modes of therapy, the individual must not be lost sight of, as no hard-and-fast rule can be laid down in the matter of doses. For, as a method of control, the estimation of the opsonic index hardly comes within the range of practical politics, and we must be guided by the results of careful clinical observation, especially the *temperature* chart, noting at the same time any increase of *pain* or *swelling* in the joints.

Thus if there be no general or local reaction, the dose is probably too small, and it may with safety be increased; on the other hand, if there is a rise of temperature, with increase in severity of the local symptoms, we must wait until these untoward effects have passed off, and then resume, but with a smaller dose than before.

Again, if the results of our initial dose are salutary, and the condition of the disorder has improved, then the indications are that the next dose shall be slightly larger.

As a safe initial dose applicable to most cases, a vaccine containing two and a half million bacteria in a cubic centimetre may be injected subcutaneously. Having regarded to the injunctions above enumerated, the initial dose may subsequently be increased or decreased, and repeated every five to ten days.

As to the length of treatment, we must be guided by the particular indications of the case; but certainly the results of a two or three months' course should make us quite clear as to the measure of improvement that can be expected from this treatment if intelligently and conscientiously carried out.

Stock Vaccines.—Acting on the assumption that the bulk of the *undifferentiated* infective arthritides, classed under chronic articular rheumatism, are caused by cocci of varying degrees of virulence, a series of stock vaccines of these streptococcal strains have been manufactured.

These *polyvalent streptococcal vaccines* contain one, two, three, five, and ten million bacteria in a cubic centimetre. The subject is inoculated subcutaneously with 0·1 to 1 c.c. of the weakest ampoule, and the injections are repeated every eight days in increasing doses.

A special variety of the same kind is *Merck's streptococcal vaccine*, of which a cubic centimetre contains 400 million germs. This suspension is termed No. I., while No. II. contains forty million germs in a cubic centimetre. If this particular preparation be used, it is well to commence with 0·1 c.c. of No. II., doubling the dose at each successive injection, until one has arrived at one corresponding in strength to 1 c.c. of No. I.

As regards spacing, if no reaction appears, the vaccine can be injected every two to four days. But if there be a severe response, at least eight to ten days should elapse, and it is well not to proceed until all local tenderness has subsided.

When one has succeeded by serial doubling in arriving at a dose of No. II. equivalent to 1 c.c. of No. I., one should only inject every eight to fourteen days, continuing this, if necessary, for a month.

Recently, too, the so-called *phylacogens* have been strenuously advocated in all varieties of chronic rheumatism. In composition they are asserted to be "sterile aqueous solutions of metabolic substances, or derivatives generated by bacteria grown in artificial media."

They are used both subcutaneously and intravenously, and in the former instance they must only be injected under the skin, and not into the muscles or fasciæ. They are repeated every five or six days, and are usually followed by a distinct rise of temperature and local reaction.

We are at present engaged in observing their effects at the Royal Mineral Water Hospital, Bath, but certainly our own, as well as recorded, results are too conflicting and too few in number to justify any conclusion at this stage as to their efficacy.

In drawing to a close our remarks on the serum and vaccine therapy of *articular* types, it is interesting to record the fact that the same methods of therapy are now being extended to the treatment of the *muscular* and *neuralgic* types of chronic rheumatism.

Thus, Goadby, in a number of cases of chronic rheumatism or fibrositis involving muscles, tendons, and nerve sheaths, has resorted to vaccine-therapy. Vaccines were prepared from organisms isolated from the urine of the subjects. The inoculations were followed by exacerbation of the symptoms, a rise in bodily temperature, and ultimately the symptoms wholly disappeared or were greatly ameliorated.*

Combined Serum and Vaccine Therapy.

It is now known that we can employ sera and vaccines in combination, or the same end can be attained by invoking a so-called *sensitized vaccine*—*i.e.*, a vaccine which has been submitted to the action of an immune serum.

Vaccination by sensitized virus was first introduced by Besredka in 1902, and subsequently was utilized by Cruveilhier in the treatment of gonorrhœa, especially its arthritic and neuralgic complications.

Now, in our section on etiology we expressed the belief that a gonococcal infection, even though remote, might be at the root of some cases of obstinate muscular or neuralgic rheumatism, notably sciatica.

---

* Greeley of New York has recorded a case of sciatica treated successfully by a vaccine made from a throat coccus. Three injections, 100 million, 200 million, and 400 million respectively, were given, and a final dose of 800 million. Zapffe of Chicago in a case of sciatica isolated from the urine staphylococci and a diphtheroid bacillus, from which a mixed autogenous vaccine was prepared. An injection of a vaccine containing 100,000 bacteria produced a typical reaction, which subsided in twenty-four hours. Subsequently at four-day intervals 250,000 and 500,000 were injected, with only a slight reaction. The fourth dose of 1,000,000 bacteria was followed by very decided reaction. Three more injections of 1,000,000 each were given, the reaction being slight after the first, absent after the last two injections. All symptoms disappeared, and had not recurred after eight months.

There is direct proof that the gonococcus can excite an interstitial myositis, and clinically there is no doubt as to the association of sciatica with both acute and chronic urethral discharges of this nature, while its arthritic manifestations are, of course, well recognized.

It is, therefore, interesting to record the fact that Cruveilhier, as the result of sensitized virus vaccination, was enabled to relieve very swiftly obstinate arthralgias of four, five, or even ten years' duration in persons who had at some time previously acquired a gonococcal infection.

The same marked amelioration, and even cure, had followed similar treatment of long-standing sciatica in victims of gonorrhœa. This clinical experience led him to believe "that a large number of arthritic diseases attributed to rheumatism belonged to the domain of gonococcic infection, and that in all cases of rheumatism where the usual treatment does not give any results, and especially if a gonococcic origin can be surmised or traced, it is well to have recourse to sensitized auto-gonococcic virus vaccination."

In this connection, too, we would like to reiterate our view that that form of chronic rheumatism associated with the name of Jaccoud is in some cases attributable to a serial gonococcal infection. It seems to us, therefore, that in types of arthritis attended by marked involvement of the tendon sheaths and fasciæ this sensitized virus vaccination might arrest the further progress of the disease, and we would suggest that the same procedure be followed in obstinate sciaticas or muscular and fascial varieties of fibrositis of obscure etiology.

We may add that Cruveilhier found that, while absolutely no result followed the use of dead sensitized virus, amelioration swiftly followed the injection of living sensitized virus. He deemed it inadvisable to take from the patient himself the gonococci to be sensitized, but procured them from cultures which he had had in stock for several months.

The injections were made in the subcutaneous cellular tissues, and the spacing of doses, according to individual variations in reaction.

In some instances there was a slight rise of temperature during the hours following the injection, with pain and erythema at the site thereof, but as a rule the general reaction was not severe.

Summary.

The results obtained by serum and vaccine therapy in the various types of chronic rheumatism are, of course, too few and too conflicting to admit of dogmatic assertions as to their efficacy.

But it seems to us that, even meagre as they are, they do appear to encourage the hope that eventually they may be found a very valuable adjunct to other methods of treatment. One salient fact, however, emerges out of all the results recorded hitherto—viz., the pronounced superiority possessed by *autogenous* vaccines over stock preparations.

Accordingly, instead of indulging in further speculation, it would appear more profitable to content ourselves with indicating the general principles which should guide us if we wish in any given case to avail ourselves of autogenous vaccine treatment.

The first essential is, of course, intimate collaboration of the clinical physician with the laboratory worker, as only by their fullest co-ordination can we hope to advance to any degree of exactitude in this therapeutic procedure.

From the side of the physician, the failure of any form of arthritis to respond to treatment by salicylates should immediately suggest that the case is not one of *acute articular rheumatism*, but some other form of arthritis which requires *bacteriological differentiation and identification.* With a view to detecting its source, expert examination should be instituted, not only of the *mouth*, *fauces*, and *nasal cavities*, but also of the *genito-urinary tract* and *intestinal canal.*

If local lesions can be detected, they should, of course, be radically treated, and coincidently a careful study undertaken of the bacterial flora found thereat. In the same way, the various *secretions or exudates* should be scanned for the presence of organisms, and in all cases an endeavour made to identify the predominant microbe. We must never be content to select haphazard any one that we may isolate from the patient's mouth, nose, urine, fæces, or elsewhere.

Only in this way can we approach to any degree of exactitude, for we are always confronted with the difficulty of deciding whether the amelioration observed is merely a coincidence, or whether it is the direct result of the vaccine treatment.

The majority of these cases, as we know, are referred to *gastro-intestinal processes of subinfection*, and how searching our investigations must be in these cases was clearly shown by Professor Adami in his illuminating address on subinfection, when he laid down the statement that in all cases "there ought to be routine blood-cultures in every cases recorded, routine examination and reports upon the stools and their predominant bacterial types, blood-counts, hæmoglobin examinations—in fact, the full clinical study of each case, so that nothing is neglected."

CHAPTER XXXIII

ARTICULAR FIBROSITIS, OR CHRONIC ARTICULAR RHEUMATISM

Local Therapy.

In the preceding chapter we dealt with those general therapeutic measures which aim at removal or modification of what are assumed to be the original or fundamental causes of fibrositis. Our remarks thereon must now be supplemented by a discussion of those *local* procedures directed towards checking the inflammatory process and hastening the absorption and resolution of the effused products. We shall in the first instance devote our attention to these modes of therapy as applied to the various joint disorders affiliated to " chronic rheumatism."

Arthralgic Forms.

The articular pains associated with *acute generalized fibrositis* usually relent to rest in bed, appropriate diet, free purgation, and diaphoresis. Local measures are uncalled for save when, after the disappearance of general symptoms, the pain persists in one or other of the articulations.

Chronic Arthralgia.—It is in these types, usually *monarticular*, that local measures are demanded. Absolute immobilization is as a rule uncalled for, the restraint, when at rest, of a crêpe or webbing bandage snugly applied over cotton-wool being sufficient. Meanwhile the joint should be painted with iodine liniment, or blistering may be resorted to in obstinate cases. As a vesicant we usually employ Canthos plaster, but light touches with a galvano-cautery are sometimes preferable. Generally, under such treatment the pain declines, and with its subsidence massage and passive movements should be enlisted to complete the cure.

Similarly, in the *osteo-periosteal neuralgias*, blisters over the thickened periosteum are frequently of considerable service, and in obstinate cases further relief may be obtained by painting the parts with tincture of iodine until desquamation of the skin

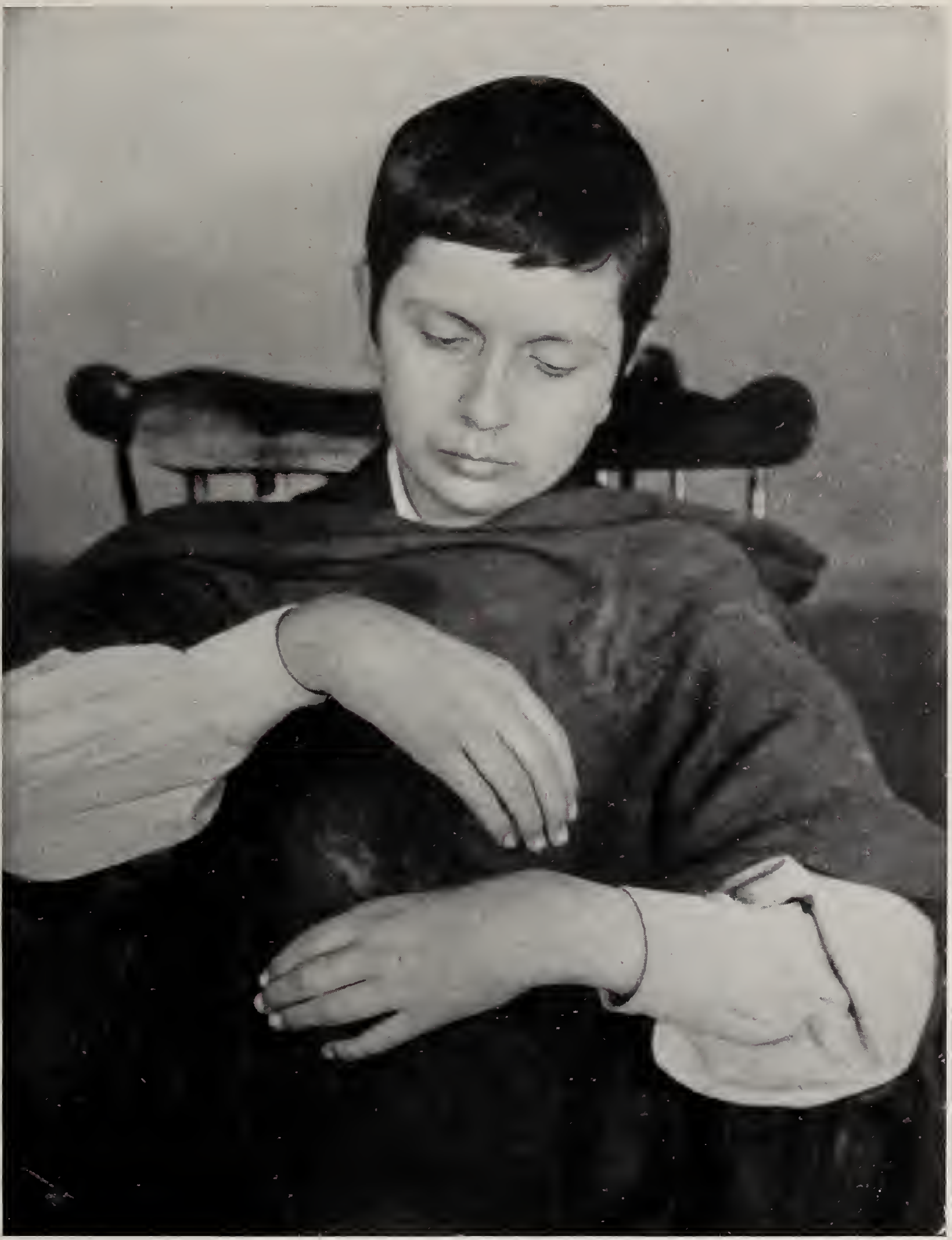


Fig. 91.—Malposition of joints. Both wrists are ankylosed in palmar flexion.

To face page 452.

occurs, or gentle inunction of the iodide and soap liniment may be employed.

While these methods very commonly suffice, it occasionally happens that those arthralgias, obviously born of a gouty or autotoxic state, refuse to remit to anything short of a prolonged course of general and local hydrotherapy; but to the technique of these procedures as applied for the relief of arthralgia we shall allude in a later section.

Periarthritis.

Synonym: Undifferentiated infective, toxic, or septic arthritis.

Acute Types.

When confronted with such, we should be mindful that in all instances the true end and aim of treatment is to restore the disabled joint to a state of functional efficiency. Trite as it may appear, this observation seems not uncalled for in view of the lamentable frequency with which this salient consideration is lost sight of.

For, unhappily once dubbed " rheumatic " in nature, there ensues far too commonly a disposition to regard the joint disorder as a purely " medical " concern—one to be treated by drugs alone, to the neglect of all those precautions necessary to avoid stiffness and malposition.

It cannot be too strongly insisted upon that these actually inflamed joints of uncertain etiology—whether regarded as "rheumatic," "infective," or "toxic," in kind—invariably require to be fixed in what would be regarded, surgically speaking, as a good posture. In this way only can the sinister menace of ultimate malposition be removed, while incidentally by such immobilization we secure for the inflamed articulation that immediate repose it so sorely needs. For during these acute phases the joint tissues are chafing under the action of various biological and chemical irritants, and if to these be added withal the mechanical disturbances inseparable from movement, we doubtless stimulate to greater activity the inflammatory process.

Rest and Fixation.

In acute phases, therefore, rest is essential, and stillness, moreover, in that position which is most conducive to cure with the least impairment of ultimate usefulness. Too often, instead of perfect immobility being secured, the patient, while encouraged to rest, is allowed to retain the joint in whatever position appears to him for the time being as most comfortable. The aftermath comes when, with the passing of the acute stage, the joint is found fixed more or less in an awkward posture, and the process of restoring flexibility, often long and painful, has to be faced.

The wards of the Royal Mineral Water Hospital, Bath, bear witness to the deplorable frequency of such oversights, with their toll of joints disabled by malposition, which carry the proverbial reproach attaching to sins of omission. To obviate these untoward consequences, fixation by means of poroplastic felt or other splint, aided whenever feasible by weight extension, should be at once resorted to.

Proper Postures.—If the knee be the joint attacked, it must be retained in a position of extension, while the ankle should be placed at a right angle to the leg, or rather less.

In the case of the shoulder, the arm should hang a little away from the side, with the hand resting against the lower part of the chest, and to this end a wedge-shaped pad must be inserted in the axilla.

The elbow should be bent at a right angle, with the hand midway between pronation and supination—that is, with the thumb upwards—while the wrist should be placed in a position of overextension, as being the one best adapted for retaining the power of gripping objects.

We have entered into this detail as the imminent risk of adhesions in these cases imperatively demands that, in the event of the undesired ankylosis occurring, the joint will be found fixed in that position which entails least diminution of its usefulness.

For whatever limitations be set to our power of obviating deformity, there is no doubt that by attention to the foregoing measures it is quite possible to prevent the development of extreme and crippling degrees of malposition. Right-angle contracture of the knee or hyperextension of the ankle is wont to arise less as the result of unavoidable compulsion than as the penalty of carelessness or pure negligence.

Relief of Pain.

Now, while fixation and weight extension may of themselves suffice to mitigate pain, it is often necessary to resort to other measures to compass this and to promote the absorption of periarticular œdema or synovial effusion. These ends are best achieved by increasing the circulation through the parts, as in this way toxins are flushed out, and the disappearance of extra- or intra-articular exudates is hastened.

Hot and Cold Applications.—Opinions differ as to whether heat or cold is the more suitable, but for ourselves we strongly favour the former, as being more grateful to these so-called

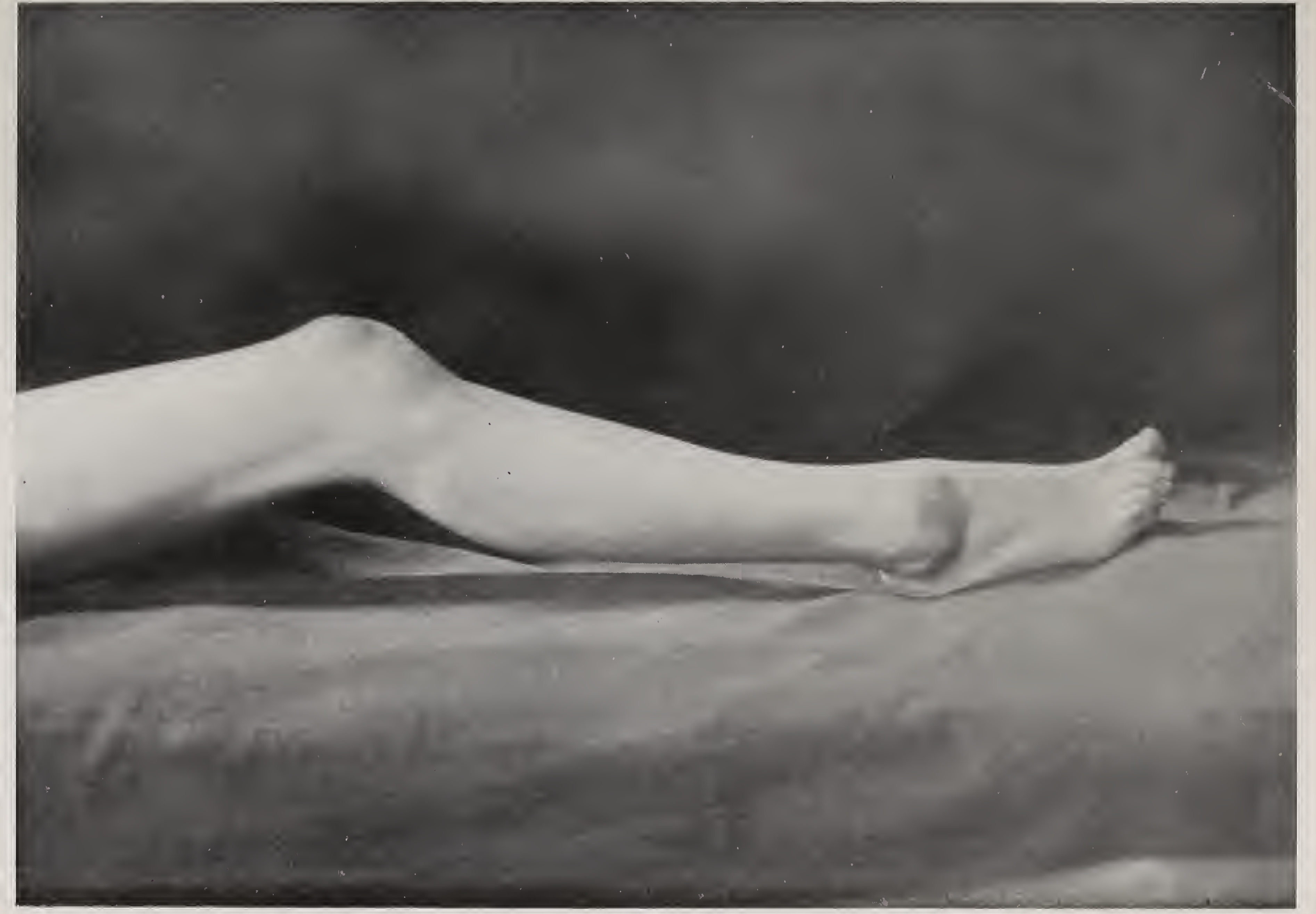


Fig. 92.—Malposition of joints. Showing flexion-contracture of knee and hyperextension of ankle.

To face page 454.

"rheumatic" subjects, whose pain is often aggravated by ice or cold compresses.

Moreover, apart from the immediate discomfort produced by cold, we believe that heat minimizes the pronounced tendency of the inflammatory process to linger on in the subsynovial, periarticular, and tendinous tissues.

As a rule dry heat is to be preferred, and whenever feasible, therefore, the affected parts should be exposed to superheated air by means of a Tallerman or some other portable hot-air bath.

Commonly, however, we have to content ourselves with hot-water bottles, a sand-bath, or flannel bags containing heated salt, and, failing these, poultices or fomentations followed by dry-packs or heating compresses.

The secret of efficacy in these thermic procedures is that they should be really hot, not merely warm, and still more should we be careful not to incur the proverbial odium of blowing hot and cold. Thus, if we enlist heated salt, there must be two bags available for the purpose. While the one is in use, the needful quantity of salt should he heated in an oven or on an iron plate over a gas stove to replenish the second when the first has got cool, and in this way heat can be kept up as long as required.

Analgesic Applications.—For this purpose we may apply the oleogen of camphor and menthol, or one of the methyl preparations, such as methysal balm or Baume analgesique, covered with cotton-wool, oiled silk, and a bandage. The activity of these remedies is much enhanced if the parts have been previously treated with dry heat or a fomentation. If pain be very severe, oleate of morphia in the proportion of 1 grain of the alkaloid to 1 drachm of oleic acid rarely fails to alleviate, or we may use Baume de Pontac, containing salicylic acid, sulphate of morphia and oil of winter green, a preparation we have found of service.

Not infrequently in the acute stages the periarticular tissues contain fluid, as evidenced by slight pitting, or at least whiteness, of the surface on pressure by the finger. If this persist, firm and even bandaging of the part over cotton-wool is often beneficial, for, apart from the restraint it exerts, the compression by means of its controlling influence on the blood-flow through the part somewhat checks the tendency to cell increase and fibrous formation. The cotton-wool may be impregnated with spirits of camphor, or powdered camphor may be used instead, and a domette or flannel bandage employed to envelop the part.

Duration of Fixation.

While rest is a fundamental necessity in acute stages of joint disease, it must not be forgotten that such enforced quietude has its disadvantages. For when immobilized the vital or organic activities of the joint sink to a lower level, the circulation through it of lymph and blood is more subdued, and ultimately, if unduly prolonged, the cartilages lose smoothness and lustre, while capsule and muscle alike shrink, and the synovial fluid becomes meagre and insufficient.

On the other hand, a timely resort to exercise stimulates the vital processes, quickens the flow of blood and lymph, and in this way hastens the absorption of inflammatory products, and by attrition smooths away inequalities. Nor is this all, for with appropriate exercise an extensive influence is exerted on muscle, joint capsule, and ligaments, which tends to prevent the appearance of that bugbear of joint disease — *contracture.* Nevertheless, when the question arises as to whether a continuance of rest or a resumption of movement is advisable, it is difficult or impossible to formulate a rule applicable to all cases.

The fact that after rest there ensues pain on attempt at movement warns us that absolute quiescence will result in considerable stiffness, often of very rapid development. Albeit, too early or too vigorous exercise may easily rekindle the inflammatory process, while too tardy a resort to it exposes the joint to the ever-present menace of extra- or intra-articular adhesions.

When, therefore, *the temperature drops, pain remits, swelling subsides, and local heat with tenderness abates,* we should lose no time in essaying passive motion, or at any rate an occasional change of posture.

While the sensitive patient may be chary of using his limb, the more robust subject will almost certainly, with the cessation of the acute symptoms, instinctively attempt to move his joint, and in the interests of a more rapid evolution of the convalescent stage the physician will be well advised to urge his patient to use his limb more and more day by day. In any case leniency at this period in the matter of exercise is but mistaken kindness. Where movement is followed by marked increase of pain, either it has been begun prematurely or the manipulations have been too vigorous. If with increased pain there be a return of tenderness and swelling, it indicates the necessity for entire rest pending their subsidence, when the efforts at restoring mobility must be renewed. If pain be aggravated without increased tenderness and swelling, it is probably referable to undue violence, and the subsequent handling must be more gentle and tentative.

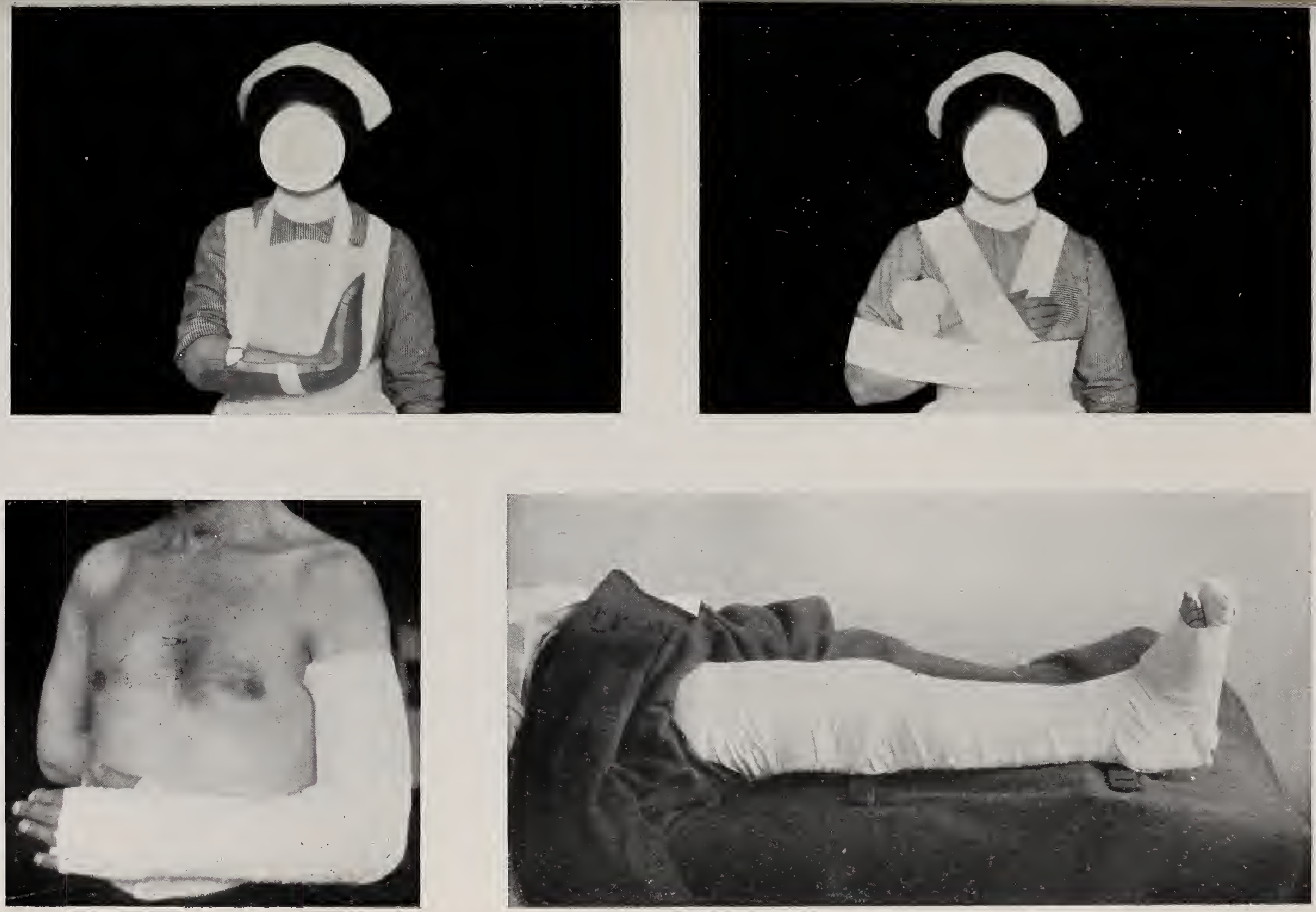


FIG. 93.—These photographs show the postures in which arthritis of the wrist, shoulder, elbow, knee, and ankle ought to be fixed to avoid ankylosis in unfavourable positions.

To face page 456.

As the stiffness relents, *active* as well as *passive exercises* should be instituted; for while the latter are enlisted more particularly in the interests of the joint, the former or voluntary movements are directed more to restoring the tone of the related muscles.

It may here be interposed that, in cases where uncertanity exists as to the advisability of attempting movement of the joint, there need be no hesitation in invoking the aid of *massage*, provided it be gentle and derivative in character. For the occurrence of recrudescences through premature or too strenuous exercises is of course to be guarded against, inasmuch as the fluid enlargement or œdema has a strong tendency to be replaced by nodular or diffuse induration of the periarticular structures.

When a case takes on this aspect, however, it has passed from the acute to the *subacute* stage, and for its management during this period we would refer the reader to the coming section, in which the various procedures—massage and so forth—will be considered in that detail which is so necessary for their true comprehension and judicious application.

Subacute Types or Stages.

General Considerations.

In the foregoing paragraphs we considered the measures appropriate for acute phases or exacerbations, and we now pass on to discuss those suitable to subacute types or stages of the disorder. Most commonly the cases of this grade which come under our notice have originated in an *acute* attack, and we are, so to speak, confronted with the residual traces of the inflammatory process.

On the other hand, the articular disease may *ab initio* develop after an insidious fashion without any definite onset, and unattended by fever, though the local phenomena are distinctly those of recent and active inflammatory change.

In either event, examples of this nature are only rarely marked by the presence of excessive intra-articular effusion, and more commonly the local variations from normal present a blend of exudation and induration implicating in varying degree the capsule, bursæ, and tendon sheaths.

Now, from the point of view of local therapy, it is highly important that we should realize that the mingled puffiness and thickening represent two stages of inflammatory action—viz., *swelling*, due to a very low grade of inflammation, and *induration*, the outcome of the later transformation of the effused products into fibrous tissues.

The bearing of this on treatment is apparent when we reflect that the swollen areas histologically consist of relatively soft tissue material, with more or less fluid, while the infiltrated portions are composed of fibrous overgrowths of varying density.

In every case these two conditions are found in different proportions, and our success in treatment will depend on the degree of accuracy with which we estimate the preponderance of one or other in a given instance.

Thus, in examples of *relatively short* duration, the new cellular elements will have as yet to a great extent fallen short of organization into fibrous tissue. In this event the therapeutic indications resolve themselves into (1) the relief of pain; (2) the absorption of the inflammatory exudate.

In instances of *longer* standing, the softer inflammatory products will have to a greater or less extent been displaced by areas of excessive fibrous hyperplasia. In such event we have, in addition to the previous desiderata, to *combat stiffness* and *restore pliancy* to the more or less sclerosed textures.

Last, but not least, we have in both the foregoing types of case to counteract any potential tendency to *malposition* of the affected joint.

Before proceeding, however, to consider the measures suitable for the attainment of these ends, it will, we think, be advisable to allude to the all-important question of *immobilization, partial or complete*, in its relation to these subacute types or phases.

Relative or Absolute Fixation.

As before noted, in cases of acute type the decline of fever and the subsidence of local and inflammatory signs clearly point to the resumption of movement, and similarly in instances of chronic nature the indications for exercise are obvious.

But in cases of *subacute* character the question is often one most difficult of decision, for quite commonly such joints do not become quiescent for months, or exceptionally years. Days and weeks may elapse during which the inflammatory process seems wholly in abeyance, when, without any apparent provocation, it again assumes a subacute form.

Happily, in many, if not most, instances of this nature the mischief is localized to a single joint; but where two, three, or more, are implicated, the clinical picture presented may be very conflicting. For while the morbid process may have apparently died down in one, it may be smouldering afresh in another articulation, and to meet appropriately the therapeutic requirements of the individual joints may sorely tax the fortitude of the patient and the resourcefulness of the physician.

Moreover, apart from the varying phases of exacerbation and quiescence that take place in any one joint, we have the further complication that their incidence may alternate in the various articulations; and so it happens that, with the repeated waxing and waning of the morbid process, the steps of treatment have often to be retraced or reversed, while of the several joints involved one may require rest, and another active or passive exercise.

But for our guidance under such circumstances it may be taken that, generally speaking, enforced quietude by fixation is contra-indicated, save when the objective phenomena clearly indicate the existence of active inflammation. But not infrequently it happens that, despite the absence of local heat, tenderness, and swelling, the joint, commonly the *knee*, remains painful and irritable. In this event a leather splint can be applied during the day, but it should be discarded by night, and the joint freely moved to insure retention of its full arc of mobility.

Again, very commonly movement of the joint is only painful during extension, and here we have found the adoption of a light knee-cage very serviceable. This may be so arranged that, while admitting of full flexion, it limits extension to a point short of producing pain, this facility being attainable by means of an adjustable slot.

When removed at night, the joint must, of course, be submitted to passive movement, and, as the range of painless extension increases, the retentive apparatus should be correspondingly adjusted until such time as it can be dispensed with.

In milder instances firm bandaging or strapping will exert sufficient restraint upon the articulations.

Similar considerations will guide us in regard of this matter of relative or absolute fixation in the joints of the upper extremity.

Where forced immobilization is indicated, we should assure ourselves daily of *the exact posture of the individual joint*, and, especially in the less painful stages of the disease, see to it that an *alternation of position* is secured at short intervals.

Thus, in the case of the *elbow-joint*, which requires particular care, the limb should never be left too long at a very obtuse or even acute angle, while we should at the same time be careful to retain the full range of supination and pronation in the forearm.

For it must not be forgotten that, while fixation is our best means of controlling the morbid process, yet, if we be not vigilant, we may attain this at the expense of functional efficiency, and to the avoidance of such untoward consequences we purpose devoting the following paragraphs.

Correction of Tendencies to Malposition.

A lively and ever-present fear of *contracture* is the beginning of wisdom in the treatment of joint disorders, for from the functional as well as the æsthetic point of view the deformities which result therefrom are the most deplorable sequels of arthritic disease.

In every diseased joint there lurks a propensity to a vicious attitude, and it is our bounden duty to check this potential tendency at its inception, and not to tarry until it crystallizes into a fixed deformity which defies adjustment save by operative procedures.

Too often the recognition of such is belated or deemed of secondary importance, but dilatoriness in this respect so frequently nullifies all other therapeutic efforts that we would insist on the correction of such proclivities as being an indispensable preliminary or accompaniment to all other measures.

Nevertheless, how often, when these cases first come under observation, do we find that either through indocility on the part of the patient or a lack of proper supervision the joint is either actually malposed or in a fair way to become so.

To resume, contractures may be of myogenous, ligamentary, or arthrogenous origin, but here we are concerned rather with those due to *disordered muscle-balance*—viz., to the preponderant action of the flexor as opposed to the extensor group of muscles.

Happily, unlike those graver forms of contracture due to *actual shortening of the muscle and retraction of capsule and ligaments*, they often relent to much milder measures of correction.

Their insidiousness of approach is as marked in subacute as in acute forms of arthritis; indeed, more so, we think, for in the latter the very severity of the pain impels us to resort to fixation for its relief, and so in this way the possibility of contracture is minimized or obviated. On the other hand, the pain in the joint—commonly the *knee*—in these subacute forms may even during an exacerbation be so slight, *when at rest in bed*, that immobilization is deemed uncalled for.

Herein lies the danger of a contracture supervening, unless we convince ourselves daily of the actual position of the limb; for, if left to themselves for any length of time, such patients are certain to find some one position more than another grateful to the affected joint.

Thus, if the *hip* be involved, the subject, instead of lying in the horizontal position, is very apt to assume a half-sitting attitude, and thereby hastens the development of a flexion contracture; or he may take to lying continuously on one side, and in this way the limb tends to assume the position of adduction, and to counteract this tendency it is advisable to slip a folded cloth or firm pillow between both legs and knees.

Again, in the case of the *knee*, if they lie for a protracted period in the lateral position, the flexor pull on the joint is unrestrained; while, if they adopt the dorsal pose, they are apt to discount its mechanical advantages by placing a pillow beneath their knee to mitigate the painful tension in their hamstrings.

Similarly, in the *ankle-joint* we have the tendency to foot-drop, with ultimate retraction of the calf muscles. Now, prevention being the better course, it is incumbent on the physician to prohibit any such habitual and faulty posture by admonishing the patient of its potential danger. This in intelligent persons may suffice, but if the irritability of the joint be such that it excites involuntary muscle spasms, then, of course, fixation must be resorted to until they are quelled.

It is important, too, to bear in mind that contractures may develop gradually even while the subject is walking about; for, given disease affecting the knee, the victim naturally is chary of leaning too heavily on the suffering limb, and consequently, raising it rather high, he walks gingerly on the ball of his foot.

Such walking on tiptoe involves flexion at hip and knee, as well as plantar flexion at the ankle-joint, and in this way, unless corrected, a contracture may develop in the knee or in the ankle, which last assumes a position of talipes equinus.

Here, again, steps must be taken to insure a proper mode of progression, either by correcting any tendency to nervous shirking, or by securing rest in a proper position for the articulation till its painfulness subsides.

So much for the *prophylaxis* of contracture in the lower extremity, and now to consider the means whereby we may correct or control the consequences of such muscular imbalance when established, and it is in the *knee* that such untoward results are most often and most clearly manifest.

Thus, very commonly the subject merely complains that when he gets up in the morning he experiences some difficulty in fully straightening the limb. In order, therefore, to redress this tendency to flexion, the limb should be placed at night in a well-moulded poroplastic splint secured with strapping or a bandage. During the day he should be counselled to keep his knee rather straight, especially when seated, and to this end should use a footstool or a leg-rest. This latter is of some value in effecting gradual extension, as, when the contracted limb is placed on such an inclined plane, the weight of the leg forces the heel down, and thus the knee is slowly extended.

Its use is more clearly beneficial in those cases in which the slight flexion of the knee is referable, as it most commonly is, to slight gluing together of the tendinous and periarticular structures, with spasm of the related hamstring muscles. The force exerted in this manner is considerable, and at first may be impossible of tolerance beyond a few moments. Its effectiveness may be much enhanced by previous massage of the parts, or exposure to a local vapour, hot-air, or electric-light bath.

Or, as a variation, in order to obtain more mobility in the range of extension, the patient may lie prone on a sofa, with his knee just on the end. A slight weight—1 or 2 pounds of shot—should then be attached to the sole of the foot sandal-wise by a handkerchief or bandage, and then the leg swung up and down.

Sitting, too, on the edge of a table, with the leg hanging down, followed by rhythmic extension and flexion of the knee, with or without weights attached to the foot, is also of service. Better still, we should, whenever possible, invoke the aid of the pendulum machines invented by Gustaf Zander for the purpose of knee flexion and extension.

In more obstinate cases of *knee* contracture it will be necessary to resort to traction exerted in the line of the deformity, and this either in bed or while the patient walks about, by means of a Thomas's knee-splint. The steady traction has a sedative action, and by allaying the muscular spasm allows the limb to be gradually straightened. In the last resort, forcible reduction or operative measures may be called for, but to the indications and methods of procedure in such circumstances we shall allude in a later section when dealing with more radical surgical procedures.

Similarly, in the *hip*-joint any tendencies to flexion and adduction will have to be combated by resorting to recumbency with traction, exerted at first in the line of the deformity, and later, when the malposition diminishes, more in the long axis of the body.

In the *ankle*, any tendency to downward displacement of the foot must be counteracted by the application of leather splints which retain the foot at right angle to the leg. When, as a result of such fixation, the irritability of the joint and the spasm of the muscles relent, no time should be lost in resorting to passive exercises for their influence on the muscles.

The development of contractures in the *upper extremity* has to be guarded against in the same vigilant manner, though, in view of the high-grade deformities so frequently met with, especially in elbow, wrist, and hands, this caveat needs reiteration.

In the *upper* as in the lower limb, care must be taken to prevent the adoption of any habitual faulty position. Thus, if confined to bed, continuous lying on the one side necessarily evokes a position of adduction of the limb, and corresponding contracture.

Again, in the elbow there is a strong tendency to extension at an obtuse angle, in the wrist to palmar flexion, and in the fingers to ulnar deviation, all of which vicious proclivities can be avoided or minimized by correct postures.

When a condition of contracture threatens in the *shoulder*-joint, the patient should be advised to practise assiduously the following manœuvres: When sitting, he should keep his elbow raised either on the arm of a chair or on a table at his side. This may be varied by standing with his elbow resting on the mantelpiece, and if at the same time his feet are kept as far away as possible from the perpendicular, the weight of his body tends to extend his shoulder.

The foregoing may be supplemented by exercises through the medium of weights and pulleys, or, better still, one of Zander's mechanical appliances. Day by day the subject may estimate his increased power of abduction and elevation of the arm by writing on the door or wall at the highest level of which he is capable.

In the *elbow*-joint, if there be any smouldering disease leading to its maintenance at an obtuse angle by muscular spasm, the following plan may be adopted: Without attempting to correct the malposition, a fixation bandage may be applied, and this after two or three weeks may so control the joint mischief, with its associated spasm, that on its removal the joint will be found capable of being bent nearer a right angle.

Or, in instances of flexion contracture, suitably-arranged weights and pulleys may be invoked, or recourse be had to some method of elastic traction.

In the *wrist*, one often has to deal with a tendency to palmar flexion, which, if possible, should be corrected by applying a cocked-up splint, which retains the wrist in a position of hyperextension.

Or, when such immediate rectification cannot be effected, the following plan may be tried: An anterior splint should be applied to the flexor aspect of the forearm and hand, but with two intervening thick pads, one placed just above the wrist, and the other beneath the palm. In this way the dome-like wrist faces the gap between the two pads, and it will be possible by means of an elastic band passing over the dorsum of the wrist, and fixed to the underlying board, to exert considerable traction.

Deformities of the *fingers* often take the form of ulnar deviation, the tendency to which in its early stages may be reduced by proper slinging; while to correct any tendency to distorted positions of the metacarpal and interphalangeal joints we may have to resort to some form of ensheathing apparatus supplemented by traction through the medium of suitably-arranged elastic bands.

It is needless to emphasize the fact that in all the foregoing measures *passive exercises* are of pre-eminent importance in overcoming any tendency to contracture. They should be arranged so as to extend the arc of mobility of the affected joint to its normal range, or at any rate as far as the altered anatomical conditions will permit, while at the same time they should be directed towards strengthening weakened muscles or extending those which are retracted.

By their means we secure for the affected muscles the beneficial effects of exercise, without making undue calls upon the nervous energy of these patients, which is often at a low ebb.

There is no doubt that they markedly assist in the restoration of the normal amplitude and ease of movement, inasmuch as they quicken circulatory processes and promote absorption of effused products.

It is not necessary to indicate in detail the passive movements to be adopted in the case of each individual joint, but the force and rapidity with which they are executed demands discrimination. It is equally essential that the operator should retain full control over the articulation throughout the arc of movement, and that there be no erratic or sudden changes in direction.

The difficulty of insuring uniformity and graduation in the degree of force exerted is a distinct drawback to passive movements as exercised by the physician or some other person, and for this reason resort may profitably be had to one or other of the various arthromotors now in use.

For in sensitive persons the approach of the physician excites such dread that not only do the muscles involuntarily contract, but this reflex inhibition is, moreover, reinforced by actual voluntary resistance. Not seldom, therefore, it results that the séance of exercises degenerates into a wrestling bout, whose outcome is decided by the relative strength of the physician and his patient. If the former conquer, he may readily overshoot the mark, and do violence not only to the joint, but also to the victim's feelings, who is apt to leave the consulting-room more impressed with his adviser's physical prowess than with his sympathy and skill.

Unless, therefore, the physician has the full confidence of his patient, and can be sure of the latter's co-operation, it is wiser at first to depend on some form of mechanical appliance.

Subsequently, as the condition improves, active exercise, with or without apparatus, may be undertaken; while, to strengthen weak extensor muscles, the exercise should be performed against resistance, either furnished by another individual or one of the many graduated appliances now at command. Nor should we forget to combine our passive exercises with massage and electrical excitation of the wasted muscles by means of continuous currents.

In conclusion, that we should at this stage have considered in such detail this question of contracture may appear unusual, as very generally discussion of this aspect of joint therapy is deferred, pending consideration of measures devoted to the relief of pain, etc. But it cannot be doubted that the prevention and treatment of contracture cannot possibly be embarked upon too soon, and in conformity with this we have accorded it attention at this early period of our scheme of treatment.

Relief of Pain.

We have already dealt with the value of relative and absolute fixation as a means whereby pain in the joint may be alleviated, and it now remains for us to consider various other analgesic measures.

Dry Heat.—To obtain definite results from this valuable agent, we must vary its application somewhat from that employed in the more acute forms of arthritis. These subacute forms are very often lingering in character, and, apart from its inconvenience, it is unwise to subject such a joint to uninterrupted and very prolonged exposure to dry heat.

For, when long continued, an excessive accumulation of heat in the part ensues, with dilatation of the deeper vessels, and in this way its desired derivative or revulsive action is either diminished or annulled.

And so, whether we use hot bottles, sand, salt, or bran bags, these should be replaced every half-hour or so by a well-wrung tepid or cool compress applied to the reddened surface for one or two minutes, so as to restore vascular tone and remove the heat stored in the skin.

Moist Heat.—The greater convenience with which dry applications can be enlisted has led to the displacement of the older fomentations or compresses. They are credited with enhancing the liability to the induction or favouring of relapses, but we suspect that in all probability this is attributable to the often careless or indiscriminating manner in which they are applied.

For when correctly managed, they constitute one of the most effectual means we possess for alleviating pain and restoring mobility in cases of long-standing joint disease.

Attention to detail is of course all-essential, and, indeed, is well worth while, when we recollect that a fomentation skilfully made and applied constitutes a local vapour bath—one, moreover, within the reach of the poorest of the poor.

For such a compress four thicknesses of flannel, swan's-down, linen fabric, or better, if available, spongiopiline, may be used, and in all instances its size should be ample.

The skin over these "rheumatic" joints is often hyperæsthetic, and it is advisable to cover it with vaseline overlaid by a single layer of thin flannel. Thus shielded, the very high temperature of a well-made compress can be tolerated, as, protected in this way, only the heated air or vapour comes in contact with the affected area.

In extent the compress should cover not only the joint, but several inches of the limb above and below, while the maintenance of heat may, if desired, be prolonged by inserting a rubber bag filled with hot water between the moist material and the outer protective layer of dry flannel or impermeable mackintosh.

These details being provided for, the further technique will vary according to the particular requirements of the case before us, whether relief of pain or reduction of swelling and stiffness is the primary consideration.

In many cases, even of long standing, swelling is slight or absent, but nevertheless the joint is the seat of obstinate aching. In these instances of *arthralgia without swelling* revulsive compresses are a most effectual means of relieving pain.

Technically they consist in the application of a hot fomentation for four or five minutes, just sufficient to evoke its maximum heating effect, and then replacing it by a cold compress lasting half a minute or less to absorb the heat of the skin.

They should be given three or four times daily, and the joint in the interim placed in a dry cotton-wool pack. Once or twice a day centripetal or derivative massage should be applied to the limb above the joint, and this latter subjected to a gentle centrifugal stroking.

Passive Hyperæmia.—While active hyperæmia from time immemorial has been used empirically to control inflammatory disorders and their sequels, it is only of recent years that passive hyperæmia, as devised by Bier, has been introduced.

Its action embodies a principle of the greatest value in the treatment of acute and chronic joint disorders. A glance at the underlying pathological condition in infective arthritis clearly shows that the inflammatory changes produced constitute but another variety of the *vis medicatrix naturæ.*

Thus, the bloodvessels dilate, while corpuscles migrate and the fluid secretions augment, all of which effects are accentuated by a state of passive hyperæmia in the affected part; in other words, the afflux of serous fluid and cellular elements is actively promoted, and in this way the local protective mechanisms reach their highest pitch of activity. Moreover, apart from this enhancement of the instinctive biological effort on the part of the tissues to subdue the infective process, we have the further mechanical effect produced by the mere congestion of the affected joint. For, as a result of the permeation of the tissues with increased fluid, the related textures become relaxed, and, passive movements being subsequently more easily tolerated, the formation of adhesions and contractures is at any rate minimized.

Finally we have the undoubted fact that the pain in the articulation is substantially mitigated; hence the greater ease with which passive movements can be performed.

Method of Application.—In applying this method, it is well to grasp at the start that its benefits can only be secured by a faultless technique. The method consists in the induction of passive hyperæmia by means of a rubber bandage, and before its application the limb above the affected joint should be enveloped in cotton-wool, or, as some prefer, by a muslin bandage. The object of this intervening layer of bandage or cotton-wool is to diminish the discomfort that may arise directly from pressure.

The rubber band should not be less than 2 inches wide, its turns should be superimposed, while there is no necessity for its whole width, when applied, to exceed 4 inches, and the end of the bandage should be fixed by means of a safety-pin.

It should be wound round the limb with a tightness sufficient to produce venous congestion without external obstruction. The patient's sensations will form the most reliable guide, if we bear in mind Bier's rule "that no pain must be caused by the treatment." If it is, or existing pain be aggravated, there is something amiss with the treatment or the method of application.

It is well to remember, as pointed out by Herbert Waterhouse in his most graphic description of Bier's technique, that, if pus be present, the pain is markedly intensified by the constricting bandage.

From the point of view of time, in these types of arthritis the bandage should be applied for some four to six hours consecutively, and then removed for a period of two to three hours, when it should be reapplied.

The interval is also a favourable time in which to invoke massage and passive exercise of the affected joint.

Analgesic Applications.—The mere enumeration of these might be indefinitely extended, for in truth everyone has a favourite remedy with which to meet certain indications, and the good results obtained are exactly proportional to the skill displayed in exhibiting their use. In employing these various medicinal preparations, it is well to remember that previous exposure of the part to dry or moist heat much enhances their analgesic action.

The liniment or unguentum methyl salicylatis co. is one of the most reliable, applied on lint covered with oiled silk and a flannel bandage. Or the familiar and well-tried amyl or anodyne colloid may be painted on, and has the great advantage that the contained alkaloids, aconitine and veratrine, can be roused to renewed activity by applying moist piline over the collodion.

The cream formed by the blending of chloral, camphor, and menthol, if rubbed gently on after a fomentation, is also, as Luff has remarked, a very serviceable anodyne.

Equal parts of chloroform and belladonna or of opium and menthol liniment are also very soothing, and may be applied on lint covered with cotton-wool.

An old-fashioned plan, and very useful among the poor, is the following: Sublimed sulphur should be rubbed in over the joint, and a little sprinkled over cotton-wool applied to the surface of the joint, and this covered with a flannel bandage. The subject should then sit with the part exposed before a hot coal fire, and utilized in this manner it has its claims to respect.

Counter-Irritation.—The pain not having relented to these measures, it may be necessary to resort to blisters, and here much depends on choice of case as well as method of technique. Frequently they are so utilized as to merit the satirical aspersion of "adding additional distress to unrelieved pain."

They are not suitable for cases with acute serous effusion, but we have found them invaluable in joints the seat of fixed pain, and in which gradual thickening or enlargement is developing.

They should be of small size, and applied successively over the periphery of the articulation, and the more superficial the vesication, the better as a rule the results obtained.

Or we may substitute for the above multiple light touches with the galvano-cautery. As before stated, they are not of use in recent inflammatory effusions, but are often beneficial when applied over bursæ or tendon sheaths, the seat of long-standing passive distension, as also in cases marked by periosteal thickening.

Pain having been largely subdued by one or other of these methods, the dissipation of the exudates and thickening has to be achieved, and to the methods most suitable for this purpose we shall now pass on. These consist of stimulating and alternating compresses, also the external application of various liniments combined with friction and passive movements.

Measures to promote Absorption.

Where the joints are not only painful, but also the seat of periarticular exudates, we must enlist not only analgesic but also excitant effects, and to attain this dual action *a combination of fomentations* and *stimulating or heating compresses* is often very useful.

The *hot fomentation* should be applied three or four times daily, and in the intervals the joint must be snugly bandaged over cotton-wool. At bedtime this should be exchanged for the *stimulating* or *heating compress*, and as its application requires care and attention to detail, a few words regarding the technique may perhaps not be out of place. Strips of old linen 1 yard long and 3 or 4 inches wide are wrung out of cold water and applied to the joint in the form of a bandage covered with several thicknesses of flannel and oiled silk. In the more severe cases this last-named application, the ultimate effects of which are stimulating and heating, may be kept continuously applied alternately with hot fomentations during the daytime.

Liniments.—In slighter cases of this nature various stimulating liniments may be gently rubbed in, of which the following is a well-known example:

℞ Linimenti camphoræ co.
Linimenti sinapis co.
Olei pini sylvestris } .. .. æquales partes.
Misce; fiat linimentum.

The joints in the intervals of rubbing to be packed in cotton-wool.

Other useful preparations of the same nature are camphorated soap liniment, or those containing capsicum, turpentine, or other stimulant and rubefacient agents.

But for the dissipation of periarticular thickenings there is nothing superior to iodine and mercurial preparations. Painting with strong iodine solutions, if long continued, leads to unpleasant soreness, and for this purpose glycerinum iodi has the advantage that the skin does not become hardened by repeated applications, nor does it peel off. Or we may use the pigmentum iodi compositum of the British Codex Formulary, which contains—

Iodine	5 grains.
Menthol	5 ,,
Potassium iodide	15 ,,
Glycerine	1 fluid ounce.

The efficacy of iodine preparations is, however, much enhanced if they admit of gentle inunction. Rough or hard rubbing is inadmissible, especially in the subacute stages, lest the sub-inflammatory process be rekindled.

For this purpose the unguentum iodi denigrescens is very suitable, or we may use one of the proprietary preparations, such as Iothion or Leukion. This latter, which contains 5 per cent. of nascent iodine with or without methyl salicylate, we have used extensively, and have found it very effectual in removing infiltration and thickenings. The well-known iodide of potassium and soap liniment is of course most reliable for the purpose of inunction.

Ichthyol lanoline also deserves to be mentioned, and is best rubbed in after a fomentation, followed by a dry-pack.

The oleate of mercury (10 per cent.) is often of great service, especially in cases with capsular or synovial thickening, and, if pain lingers on in the joint, may be combined with morphia (½ grain to 1 drachm).

It is extremely probable that the stimulant and absorbent action of these agents is markedly reinforced by the friction which accompanies their usage.

Measures to combat Stiffness.

To restore motion and pliancy of diseased parts is one of the most difficult tasks we are called upon to compass. Here the indications are not only to remove unyielding exudates and infiltrations, but also to exert a sedative and antispasmodic action on the related muscles. For this purpose, therefore, we should enlist a *combination of stimulating or heating compresses with those of alternating temperature,* reinforcing their effects by massage, passive and active movements, associated with electricity.

The principle of the *alternate compress* is of course similar to that of the Scotch douche, whose rapid alternations of heat and cold produce such powerful revulsant and absorptive effects.

It is in default of any facilities for this latter that we should give alternate compresses a trial. They consist of a series of compresses changed every half-minute or so, and the cold and hot applications should be of *equal length*, finishing up always with the former.

In other words, a hot fomentation is exchanged for a towel wrung dry out of cold water, and this series of alternations repeated several times daily.

Derivative or centripetal massage of the associated muscles to relieve spasm and promote absorption, with subsequent passive movements, should be performed twice daily. In the intervening periods and during the night the joint should be enveloped in a *stimulating or heating compress.* This must be wrung very dry out of very cold water, then covered with flannel and mackintosh. Used in this way, it stimulates local heat production and hastens metabolic or vital processes in the sluggish tissues.

If more profound effects are desired, we may, in applying the alternate compress, substitute for the cold application cold friction of the part with the hand, or friction with the mit, using for this purpose cold brine or salt. If a good bathroom is available, these same resolvent effects, though more vigorous, may be obtained by alternate hot and cold pail douches.

When the part under treatment is painful, whether we use alternate compresses or pail douches, it is well to prolong the hot application (heat for two minutes and cold for fifteen seconds), but in the absence of tenderness the applications should be of equal length—viz., when purely resolvent and not analgesic effects are desired.

Massage.

It need hardly be said that massage is contra-indicated in the presence of exacerbations of joint trouble, and its use should be confined to *subacute* and *chronic* stages. In subacute forms, where vigorous excitation must be avoided, effleurage or light stroking is the only rational and effective measure. On the other hand, in the presence of old exudations, where it is desired to effect the dissipation and resorption of organized fibrous formations, effleurage in combination with friction is called for.

All séances of joint massage should open with a process of *effleurage*, or stroking. This should be applied to the limb in a *centripetal* direction, beginning at a point just above the affected joint; the return flow of blood through the veins is thereby quickened, and incidentally the arterial as well as the venous and lymph circulation is accelerated. In this way the capillaries and absorbents of the inflamed joint are put in a very favourable condition to take up and dispose of effused materials.

Too often no attention is paid to this essential point—the direction of the applied friction, whether exerted centripetally or centrifugally. For if exercised *centrifugally*—in opposition to the venous current—the circulation through the affected region is impeded, vital changes are slowed, and the ultimate effect produced is sedative.

Now, this is the very reverse of the influence we wish to excite, for by retarding the already sluggish circulation we favour the development of the new cellular elements into fibrous tissue.

This derivative massage of the limb above the joint should always precede any direct friction of the latter, and it is difficult to over-estimate its value when combined with gentle mercurial and iodine inunction of the actual joint surface.

In more chronic forms with definite periarticular and capsular thickening, the preliminary effleurage must be followed by friction movements, the force of which will vary according to the consistency of the deposit, the energy displayed being gradually increased as the parts grow more tolerant of manipulation.

It is at the close of a massage sitting that *passive movements* are most advantageously employed. Where irritation and pain follow their performance, gentle *centrifugal* stroking of the actual joint surface will exercise a grateful soothing effect.

In conclusion, the foregoing résumé of treatment of subacute arthritis comprises all those modes of therapy which are capable of being carried out in any house with the aid of a careful and intelligent person, though of course to insure success they must be conscientiously and perseveringly employed.

Albeit, they by no means exhaust the agencies at our disposal, for now special methods of treatment, such as ionization, hyperæmia, and so forth, are coming day by day more within the reach of the ordinary household, though formerly they were unattainable except at well-equipped spas or hydropathic institutions.

In the coming sections, therefore, we purpose dealing with these more highly specialized methods of therapy, and the indications for their employment in subacute and chronic types of arthritis.

Subacute and Chronic Types or Stages.

Special Modes of Therapy.

From the pathological aspect no hard-and-fast line can be drawn between subacute and chronic types of arthritis, for only by imperceptible gradations do they pass one into the other. If there is any distinction possible, it is that the latter, as it were, represent the culmination of the inflammatory process, which in the former is still active and progressive. In other words, in the chronic varieties the inflammatory products will have proceeded to their fell end—viz., to new fibrous formations which permeate more or less diffusely the joint structures. But though this fibrous overgrowth constitutes the end-product of the morbid process, we have still to reckon with the inherent tendency of all such fibrous thickenings to undergo progressive condensation and shrinkage.

In such cases the end and aim of our therapy is—(1) To soften the firm cicatricial tissue which permeates the capsular structures and surrounding parts, and so to lessen the pressure exerted by it on contiguous nerve filaments, as undoubtedly the slight swelling of this fibrous overgrowth after exercise or in response to atmospheric changes mechanically excites pain. (2) To combat the retraction of the muscular, fascial, and capsular tissues.

Briefly put, our therapeutic efforts must be directed towards promoting tissue change and absorption by means of increased vascularity, this being reinforced by massage and exercises to increase the suppleness of the sclerosed textures. Naturally, the more chronic the case the harder and the more resistant does the new fibrous formation become, and correspondingly less easy of influence; but for the same reason in such cases our remedies can be exhibited with greater vigour and with less danger of doing harm.

The ideal treatment of such subacute and chronic types is that they should, when feasible, be sent to some spa or institution, where, in conjunction with general measures, their articular lesions can be subjected to local douching, active hyperæmia, and so forth, and to the consideration of such methods of therapy we now pass on.

Local Hydrotherapy—Douches.

In one form or another douches have for centuries been used for chronic joint affections. As in all other therapeutic measures, care and discrimination must be used in their employment if their most beneficial effects are to be achieved. Three factors have to be considered—the *volume* and *pressure* of the impinging water, also its *temperature*.

The size and form of the stream determine to a great extent its thermic and mechanical effect; *ceteris paribus*, the greater the volume the more marked the results produced.

The pressure is a most important factor, as the influence exerted on the circulatory and lymphatic vessels in deep-seated tissues will be directly proportional to the force of delivery.

In the absence of pressure, the action of douches, whether hot or cold, is in the main superficial, if we except the reflex stimulation that follows their application to particular cutaneous areas.

While extreme pressures may be allowed in selected cases, it must always be borne in mind that low pressures are especially indicated when dealing with regions, the seat of pain.

When warm or neutral, douches exert a local and reflex sedative action; when cold, a powerful stimulant and tonic effect.

Hot douches at strong pressure exert an excitant effect similar to that of a cold douche, but the former at low pressure are powerfully analgesic, especially when employed in combination with the cold, as in the Scotch or revulsive douche.

We see, therefore, that in this therapeutic agent we have a weapon of great power either for good or evil, and the results achieved will be exactly proportional to the skill with which temperature, duration, and pressure are prescribed to meet individual requirements.

We now pass on to consider their application in regard to the treatment of *subacute or chronic joint affections*.

Relief of Pain.—In very painful joints douches of any description may be intolerable, and the sensitiveness may have to be reduced by milder methods, such as dry rubbing or cold-water friction.

Extremes of temperature and pressure being inadvisable, we should always begin with mild measures, such as a tepid fan or spray douche (80° to 92° F.) of low (4 to 8 pounds) pressure. This may be replaced later by a hot (104° to 110° F.) broken jet or rain douche of 10 to 15 pounds pressure, and by such graduated procedures pain will often be relieved.

If obstinate, a *combination of hot and cold douches* is often effectual, and we can strongly recommend the following procedure, as laid down originally, we believe, by Kellogg:

The hot stream is first directed on to the joint at a temperature as high as can be comfortably borne. Impinging only on a small area, a temperature of 110° to 120° F. may be gradually reached, and, according to individual tolerance, be maintained for two to four minutes, when the skin becomes dusky or purplish red. At this point a cold douche (70° to 60° F., or lower) is played on to the joint for five to thirty seconds. This is turned off directly the dusky red hue gives place to a scarlet tint, which occurs as passive distension of bloodvessels is replaced by active dilatation.

Our object being to obtain a *derivative or sedative* rather than a tonic or stimulant effect, the cold douche should stop short of producing pallor and chilliness of the skin's surface, as if so the subsequent thermic reaction will certainly aggravate the pain. The foregoing is, of course, a modified Scotch douche;

but in this, as ordinarily administered, the cold application is too prolonged. A broken jet, fan, or spray douche (3 to 15 pounds pressure), should be used, strong percussion effects being undesirable.

Relief of Stiffness and Swelling.—Where pain is absent, and active mischief has ceased, stimulating applications are indicated.

Alternating jets or sprays are most suitable, the hot and cold douches being each from fifteen to thirty seconds' duration. The more remote the extremes of temperature, and the more abrupt the transition from hot to cold, the greater the excitant effect.

Dry Massage Douche.—Simultaneous massage greatly reinforces the stimulating and absorbent action of douches. If the skin be sensitive, this may be annulled by using a neutral douche; but otherwise very hot douches (115° F. and upwards) or very cold douches (65° F.) may be used at a high pressure for their derivative effects. Very hot or very cold douches are contraindicated if joints are inflamed, congested, or extremely painful to pressure. In the absence of such indications, a cold percussion douche of high pressure (20 to 30 pounds) is of exceptional value in long-standing examples, the seat of exudates, and marked by rigidity and limitation of movement. Coincidently the related muscles should be massaged.

Hypothermal or cold douches are very valuable in *degenerative arthritis* with *atony and relaxation of ligaments.* Where there is great sensitiveness to cold, a hot rain douche, a local hot-air or electric-light bath, will render the patient more tolerant of a subsequent cold application.

Fortunately, hot douches (104° to 120° F.) at high pressure are, like colder applications, stimulant in their action, and may be employed when hypothermal douches are inapplicable.

Wet Douches.—In this procedure the patient is immersed in a bath 98° F. or higher, while an undercurrent douche (110° to 115° F.) is played on to the painful joint, a cushion of water intervening so as to moderate the impact. The same principles as in dry douches govern its employment, but it is chiefly valued for its analgesic effects.

In conclusion, douches may be advantageously combined with other hydriatric procedures—vapour, Turkish, Russian, hot-air, and electric-light baths.

Local Vapour Bath.—This is a long-established and favourite method of inducing increased vascularity, though to a large extent superseded by local hot-air and light baths.

It produces profuse local perspiration of the skin over the affected part, but as a rule a temperature exceeding 122° F. is not comfortably borne. It is to be preferred in cases where the skin is hypersensitive or irritable, and forms an excellent preparation for a subsequent cold application, massage, or ionization.

Treatment by Hyperæmia.

Local Mud, Peat, Fango, and Sand Baths.—These local hyperthermal applications justly enjoy considerable repute in the treatment of localized types of " chronic rheumatic " arthritis.

They are especially suitable for cases presenting cardiac debility, in whom the weight of the superincumbent mud or peat in a general exposure is apt to prove oppressive.

Compresses or pads of mud or peat at a high temperature (in the case of fango, 120° to 122° F.) are placed round the affected joint, and, according to the obstinacy of the case, are allowed to remain *in situ* for one or more hours.

A very useful domestic remedy for reducing hyperæmia is a so-called " sand bath." Heated in an oven, the sand is poured into a bucket or foot-bath, and allowed to cool to 120° to 122° F. The affected joint should then be plunged into the hot sand, and held immersed for twenty to thirty minutes, night and morning. It is most easily applied to the hand and foot.

These various applications are undoubtedly of great value in promoting the absorption of exudates. Their therapeutic action in some instances is doubtless attributable to radio-activity, and packs of uranium mud or actiniferous earth have proved valuable in these chronic joint affections.

Local Hot-Air and Light Baths.—The active or arterial hyperæmia induced by these baths is more suitable for the treatment of chronic arthritis than the passive or venous congestion produced by Bier's method.

Because of the more intense degree of hyperæmia produced, *non-luminous* baths seem to be more effectual in hastening the absorption of long-standing infiltrations or exudates.

Within reasonable limits, the greater the elevation of temperature, the more profound the increase in vascularity induced in the exposed part; but extremes are unnecessary.

The effect of a local hot-air bath is to produce profuse local sweating, with intense cutaneous congestion, and ultimately general diaphoresis. It is wiser, therefore, even in local applications to advise the subject to undress wholly, covering himself meanwhile with a blanket; for usually a terminal procedure, not only local, but *general*, is called for to ward off chilling from evaporation. As regards intensity, we have used Greville baths at temperatures from 250° to 350° F. and over, but are convinced that just as good results accrue at 230° F.; while in

Tyrnauer chambers, which we have found most useful for local exposure, 150° to 200° F. fulfils all requisites.

It must never be forgotten that the tolerance of patients is not always a reliable criterion in the matter of temperature, as the sensibility of the skin is diminished. Especially is care called for in *gouty subjects with glycosuria* and those with *arterio-sclerosis.*

The temperature should be gradually raised, but not abruptly, and never to the point of producing pain.

In a Tyrnauer bath a temperature of 170° to 200° F. is attained in six to eight minutes, and may, according to the case, be maintained at this level for twenty to thirty minutes, then gradually cooled, the whole process consuming about an hour.

Owing to their greater penetrative power, and their probable superior efficacy in vitalizing sluggish tissues, light baths are more potent in cases which are of long standing and marked by secondary degenerative changes.

After-Treatment.

In the case of joints subjected to *local douches* or *vapour baths,* it is always advisable that they should be subsequently packed in cotton-wool, to prevent possible *chilling by evaporation.* When there are special indications for reinforcing their effects, they must, according to the case, be followed by a revulsive, alternating, or stimulating compress.

Again, the effects of *local hot-air and light baths* may be prolonged if the joints on removal are wrapped in cotton-wool covered with rubber cloth and flannel. Such a course is indicated in very chronic forms, and both bath and compress may be used twice daily.

Where pain is not prominent, but rather *stiffness,* the parts while still perspiring should be massaged, and passive movements undertaken. Or we may administer ionization subsequently, and in the case of the shoulder we have found a leucodescent lamp most convenient for applying the preliminary radiant heat.

If more stimulating effects are desired, cold friction with the wet hand or a towel, or a brine rub, may be applied, or, if the ligaments be relaxed, a prolonged cold douche.

In hot-air and light baths we have pointed out the danger of chilling by evaporation, and such local measures should, therefore, when possible, be combined with a terminal cool or tepid application to the whole body.

In many of these rheumatic subjects, rubbing the limbs with alcohol seems to suit them better than immersion baths or graduated needle douches.

In conclusion, it need hardly be said that the same care and after-treatment are called for in regard of peat, mud, fango, and sand baths, if the best results are to be achieved.

Electro-Therapy.

Continuous Current.—This is of value in relieving pain in a joint or diminishing *spasm of the related muscles.* Inasmuch as the smaller the electrode the more concentrated the action of the current, the positive electrode, which is placed over the painful area, should be large. A current of considerable intensity may be used for a period of twenty to thirty minutes daily, or every second day.

To obtain the best sedative effects, the current should be increased and diminished *gradually* through the medium of a rheostat.

In joints unduly sensitive to massage, the sensitiveness may be reduced by the passage of a *faradic* current through the joint for ten to fifteen minutes.

Ionization.

The introduction of medicinal substances into the interior of the joints by means of an electrical current is now in extensive vogue, both as a means of relieving pain and promoting absorption in periarticular and synovial affections. It is, of course, in the more accessible or superficial articulations that its beneficial effects are most easily attainable.

Analgesic Action.—If relief of pain be the desired end, salicylic ions by general consent appear to be the most reliable.

A 2 per cent. solution of sodium salicylate should be used with sixfold pads of ample size, and a current of 20 to 30 milliampères passed for twenty to thirty minutes. Too frequent applications of this strength may cause injury to the skin, and in Lewis Jones's opinion are inadvisable oftener than twice weekly.

Sclerolytic Action.—For absorbent effects a combination of lithium and iodine, the former at the positive, the latter at the negative pole, is widely lauded, a current of 15 to 30 milliampères being utilized; or, what is equally reliable, the joint may be painted with iodine liniment, and the same current passed through it for ten to fifteen minutes.

As a variation the Schnee four-cell bath may be used where cataphoresis is indicated. The conveniences it possesses for local or sectional application are obvious, and drugs can be added to the water in the cell and carried through the skin by means of continuous current.

It is necessary to emphasize the fact that the use of too mild currents is futile, and to secure adequate results a prolonged

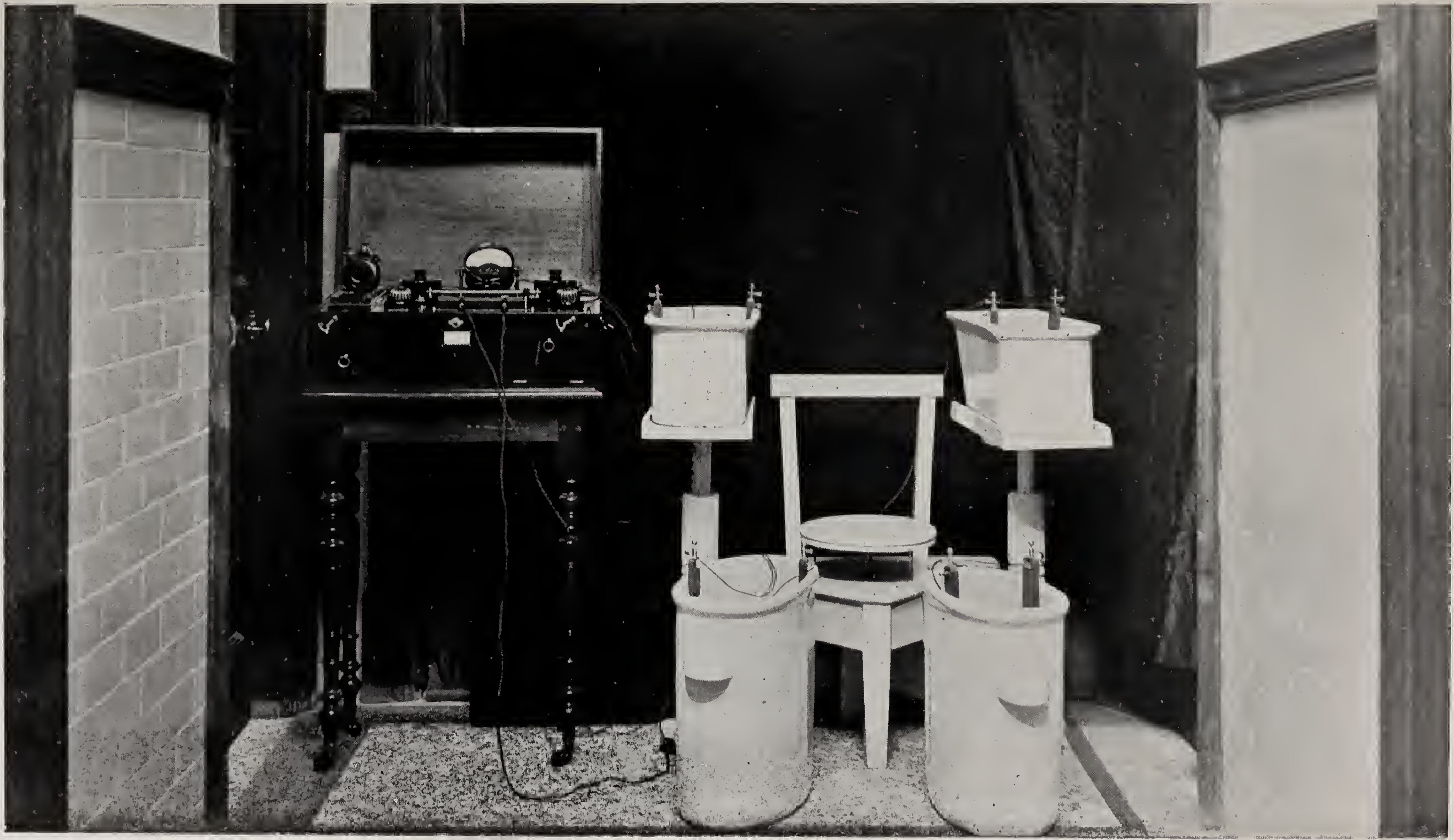


FIG. 94.—Schnee four-cell bath.

To face page 478.

series of séances is often necessary. To our mind the effects of ionization are not so outstanding as to overshadow the older methods of achieving the same ends.

High-Frequency Currents.

It is claimed that favourable effects on local and general metabolism are exercised by this form of electricity. We ourselves have found it of some utility in relieving articular pain. Recently, however, more striking results have followed a modification of this mode of treatment, known as *diathermy*. In the former or older method of high-frequency apparatus the oscillations were *intermittent*—in other words, were not sustained.

As opposed to this, those from a diathermy apparatus form an *uninterrupted* series—*i.e.*, the oscillations are sustained.

The physiological effects of these high-frequency currents are, in all probability, referable to their *heating* action.

Such is their capacity in this respect that Berndt has suggested that, without damaging the structure of the joint, they may possibly heat its interior to such an extent as to destroy an organism, such as the gonococcus, *in situ*. Whether or no such a profound effect on local infective processes can be achieved, there is at present a widespread belief that we have in this agent a very powerful adjuvant to the treatment of chronic joint affections.

Static Wave Current.—This is now coming into use as an accessory method of inducing a state of active hyperæmia in chronic joint affections. It is claimed that it restores the tone of the affected area, removing stasis and stimulating nutrition.

Eliot Creasy, who speaks highly of its use in assuaging pain and restoring mobility, advises its combination with intensive irradiation of the affected joint by means of a leucodescent lamp.

More recently Grace has commented on the extraordinary swiftness with which synovial thickening or induration undergo dissipation if treated with the static spark, while the associated spasm of the related muscles quickly declines.

Conclusions.

In reviewing the foregoing résumé of the methods of treatment applicable to these undifferentiated types of infective arthritis, it will be noted that the therapeutic weapons at the disposal of the physician are indeed multiple. Their variety would, in truth, be embarrassing were it not for the consoling fact that the underlying principles of their application are identical: namely, they aim at, firstly, *the control of the morbid process ;*

and, secondly, *the removal or amelioration of its even more troublesome sequelæ.*

In regard of their individual efficacy, opinions of course differ somewhat widely; but a critical comparison of the results achieved has convinced us that the key to success resides not so much in the particular line of therapy followed, as in the skill and discrimination with which it is adjusted to the varying needs of individual cases.

But, before closing this section, we must allude briefly to the increasing part played by purely surgical measures in the treatment of certain complications or sequels in these infective types of arthritis. Such operative intervention finds its place in all types and stages of the disorder—in the acute, the subacute, as well as the chronic—and we are fain to think that our therapeutic efforts in this sphere of disease will never attain to their highest pitch of perfection until it be recognized that the varied requirements of these complex cases can only be adequately met by the close co-operation of both physician and surgeon.

Surgical Measures.

In these *undifferentiated types of arthritis* we must never lose sight of the fact that, though unaffiliated to any special organism, they are almost certainly of *microbic* origin. Accordingly they display infinite grades of severity, and, as in specific forms of infective arthritis, there arise occasionally certain contingencies, apart from mere resultant deformity, which call for surgical intervention. Moreover, it is imperative that we be alive to the surgical necessities of these cases if we would achieve the desired end of our therapy—viz., the restoration of the damaged articulation to a state of functional efficiency.

We fear, however, that but too often we lose sight of this ideal, and rest content—though not perforce—with a measure of recovery which falls far short of that attainable. These shortcomings are partly attributable to the frequency with which these types of arthritis in their acute stages are confused with *acute articular rheumatism*, when forthwith, *ipso facto*, they are deemed without the pale of surgery.

Again, apart from this source of fallacy, we are but too apt to forget that the inflammatory process within the joint may leave behind it troublesome *sequels*, whose presence, if unrecognized, may jeopardize the future functional stability of the articulation. Therefore, to minimize the occurrence of such deplorable errors, we purpose indicating the special circumstances under which operative interference is called for in the acute, subacute, and chronic stages.

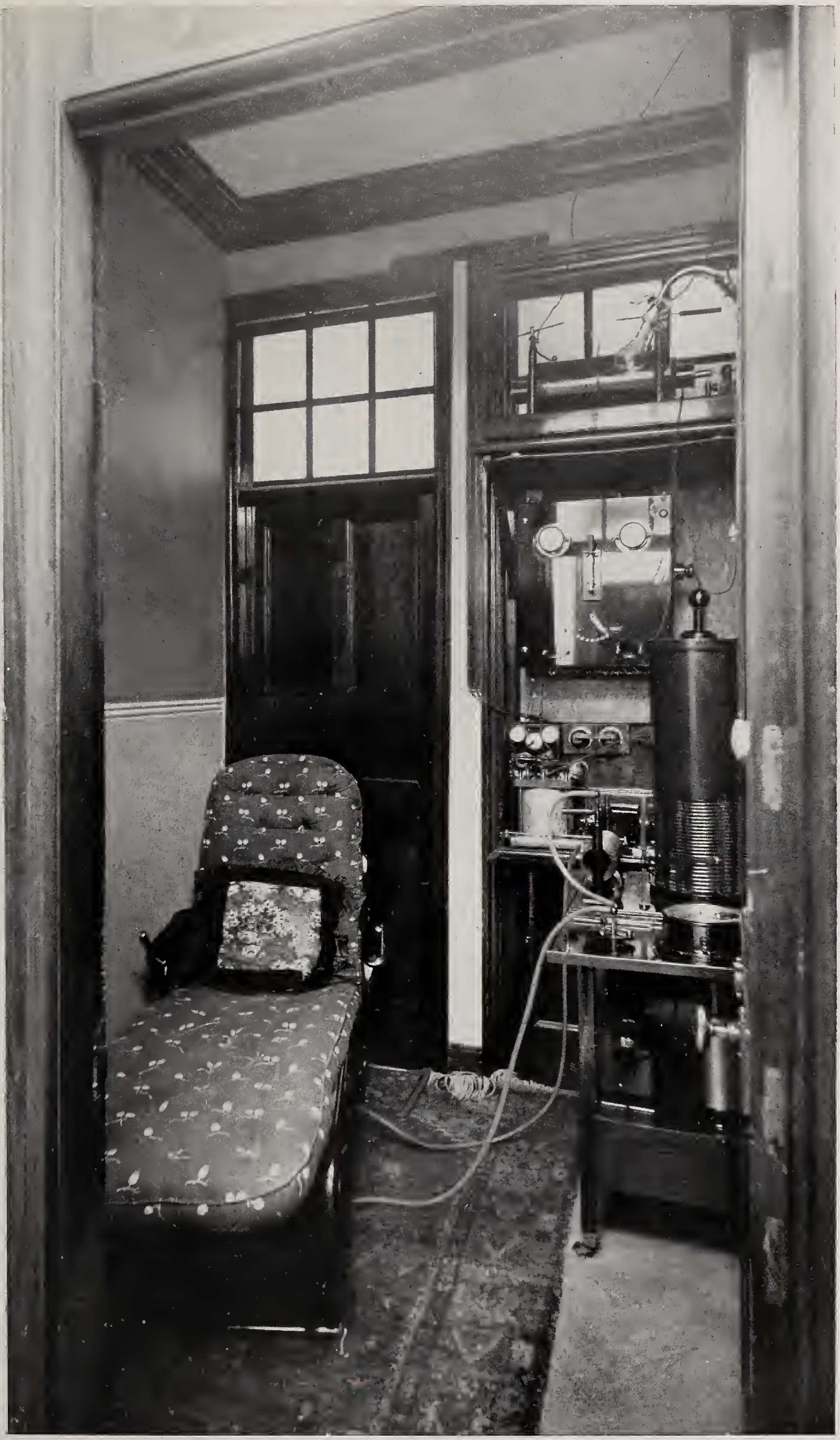


FIG. 95.—High-frequency couch.

To face page 480.

Acute Stages.

As before stated, these cases betray endless variations in severity, and every now and again the very intensity of the arthritis clearly indicates that more radical measures than those previously outlined must be undertaken.

The nature of these intense forms of *non-purulent* arthritis is disclosed by their fulminant onset, with marked constitutional disturbances. The local phenomena, too, are more pronounced, the pain, swelling, and tenderness of the articulation evincing a marked tendency to rapid and progressive increase.

In such severe examples it is probable that we are dealing with an acute *streptococcal, pneumococcal,* or *gonococcal* type of arthritis; but whether their exact etiology be ascertainable or not, the principles of treatment are identical. Whatever be the nature of the causal organism, the acuteness of the infection points to the advisability of incision and subsequent flushing of the joint cavities, so as to rid them more speedily of the contained microbic or toxic irritants.

Such *articular lavage* with hot sterile saline solution may be called for within a week of the onset, and very commonly it is true that cases presenting these characteristics prove to be of gonococcal origin.

This possibility indeed must always be borne in mind when the etiology is at all obscure, for there is in these gonococcal forms a pronounced tendency to the formation of *adhæsions,* with subsequent malposition—an untoward consequence which may be most surely obviated by such flushing and drainage of the joint cavity, supplemented by timely resort to passive exercises of the involved articulation.

Happily, such intense forms of arthritis are rare, and in the large bulk of examples that come before us the infection is of attenuated virulence, and responds favourably to the less drastic measures described in previous sections.

Needless to say, in the after-treatment of these more acute forms every advantage must be taken of massage, hyperæmia, and other measures, whose utility in restoring the functional efficiency of the disabled joint is so well ascertained.

Subacute and Chronic Stages.

We have before commented on the too great readiness with which we assume recovery to have taken place in these infective forms of arthritis. Provided that *pain, tenderness,* and obvious *swelling* have departed, we are apt to regard our task as accomplished, despite the fact that the subject complains that the joint is still in a state of irritable weakness.

The common cause of such impaired efficiency is thickening of the capsule, with *enlargement of the synovial villi*, whose presence interferes mechanically with the free and easy movement of the joint.

Such overgrowth of the synovial fringes may ensue even in cases of quite moderate intensity; but, as the symptoms distinctive of their presence only become prominent when the acute phase has passed, they are apt to be misconstrued as mere residual stiffness, which will in time pass off. This perfunctory attitude on our part must be abandoned, as joints disabled in this manner do not tend to get well of themselves, but rather stand on the threshold of another sequence of pathological events.

For, apart from the functional disability they occasion, the enlarged villi lead to erosion of cartilage, and ultimately, in our belief, to a condition of osteo-arthritis. Consequently, in any given case, when with the passing of the more acute stage the sharpness of the pain relents and the swelling subsides, we should not regard it too lightly as "cured," if there be any impairment of functional efficiency.

The *knee* is the site of predilection for villous hypertrophy, and the symptoms suggestive of its existence are—stiffness, difficulty in full extension, with occasional pseudo-locking and recurring effusions.

In such cases firm bandaging, strapping, or a snugly-fitting knee-cap may be at first employed; while at the same time it is essential that any contributory factor to the instability of the articulation, such as flat-foot, should be thoroughly corrected. If, notwithstanding, there be a constant tendency to nipping of enlarged fringes, then *arthrotomy* for their removal offers the speediest and most reliable means of obtaining a lasting cure.

In rarer instances, the continued functional disability of a joint is referable, not to capsular thickening with villous hypertrophy, but to the *persistence of an intra-articular exudate containing masses of detached fibrin.*

Here, again, the arthritic mischief is kept alight by the "internal traumatisms" constantly occasioned by these mechanical impediments to free-and-easy motion. The operative indications are in this instance *aspiration or incision*, with evacuation of the fluid and removal of the inspissated layers of fibrin.

Nor do the foregoing exhaust the sources of functional disability, for the periosteum near the articular ends sometimes becomes involved in the inflammatory process, with the formation of *bony spurs or exostoses.* Their location may be such as to interfere with or restrict the full range of movement, and here again, if their site be one favourable for operative intervention, their removal is indicated.

It need hardly be said that all the foregoing operative measures should not be undertaken while the morbid process is still *acute* or undergoing exacerbations.

Lastly we would emphasize the paramount necessity of realizing the far-reaching consequences of these sequelæ of infective arthritis, which, if untreated, so seriously compromise the future integrity of the articulation.

In the interests of their earlier recognition, we would urge that we be more chary of classing as " recovered " these functionally disabled joints, for there is little doubt that we use this term too flippantly. The adoption generally of a more critical attitude in this respect could not fail to insure their more frequent detection, while early operation in selected cases would obviate an amount of unnecessary suffering and disability.

Correction of Deformity.

The ideal treatment of deformity is, of course, *prophylactic*, and to this end we dealt at length in earlier sections with the advantages of absolute and relative fixation during the progress of acute stages or exacerbations of these infective arthritides.

We discussed also the means whereby the inherent tendency in all inflamed joints to contracture and malposition might be obviated, and in addition considered the methods by which such vicious attitudes, when established, might be overcome, if of recent date and due largely to *muscular spasm.*

It now remains for us to deal with those instances in which the joint deformity is *fixed* and due to *peri- or intra-articular adhesions*, with or without *retraction of the capsular*, *tendinous*, *or fascial structures.*

True or *bony* ankylosis only rarely occurs in these undifferentiated and non-purulent forms of infective arthritis, but occasionally, when as a result of secondary villous overgrowth a complete erosion of opposed layers of cartilage has ensued, this type of union may occur.

It will therefore, perhaps, not be out of place if, by way of prelude, we discuss these various forms of joint stiffness and their differentiation.

Exclusion of Bony Ankylosis.—Despite its rarity, it is always advisable, as a matter of practical import, to exclude the existence of bony union before attempting to restore the mobility of a stiff joint.

This is by no means an easy matter, as we have ourselves realized, for the disclosures even of a skiagraph, although, of course, of value, may be misleading. Skiagraphy alone, however, should not be depended upon for an absolute diagnosis, and we should always combine it with careful examination of the joint, with or without anæsthesia.

Fortunately, it is in the knee-joint that this question of bony union usually comes up for decision. We say "fortunately," as, this joint lying between long limb segments, it is easier to estimate the presence of slight degrees of movement or springiness when attempts at flexion are made.

Osseous ankylosis is distinguished by the following features: *Absolute immobility, lack of pain on attempt at movement,* and also *absence of muscular twitching.*

In *fibrous* ankylosis, whether due to peri- or intra-articular adhesions, more or less mobility is retained; but pain ensues on movement, with spasm of the muscles antagonistic to it.

But, to resume, in the vast majority of these undifferentiated arthritides their stiffness and malposition is referable to thickening and retraction of the capsular and ligamentous structures, with shortening of the muscles and gluing of the joint surfaces by fibrous adhesions of varying length and consistency.

In any given instance one or other of these causes may predominate, and, as far as possible, we should endeavour to ascertain the exact anatomical cause of the loss or limitation of movement.

Differentiation of Various Forms of Fibrous Ankylosis.—It is now necessary to distinguish as far as possible between periarticular and intra-articular adhesions.

Periarticular Bands.—In this variety the adhesions may be perisynovial in site, or bands may exist between the capsule and adjacent muscles or aponeuroses. They may be situate either on the flexor or extensor aspect of the joint, with, of course, corresponding interference with the full and easy performance of extension or flexion. Usually the restriction is more pronounced *in some particular direction,* but within the limits imposed by the adhesion movement is free and easy.

If, however, this be transgressed, the patient is brought up sharp by a *sudden* stab of pain, often of sickening character, which, however, immediately ceases when the limb is allowed to fall into its customary position.

On passive exercise of the joint, the same abrupt check to a previously smooth movement is experienced as soon as traction on the adhesions occurs. At this point, too, the muscles can be felt to twitch and pass into a state of defensive spasm.

This is well exemplified in those rarer instances where, in the

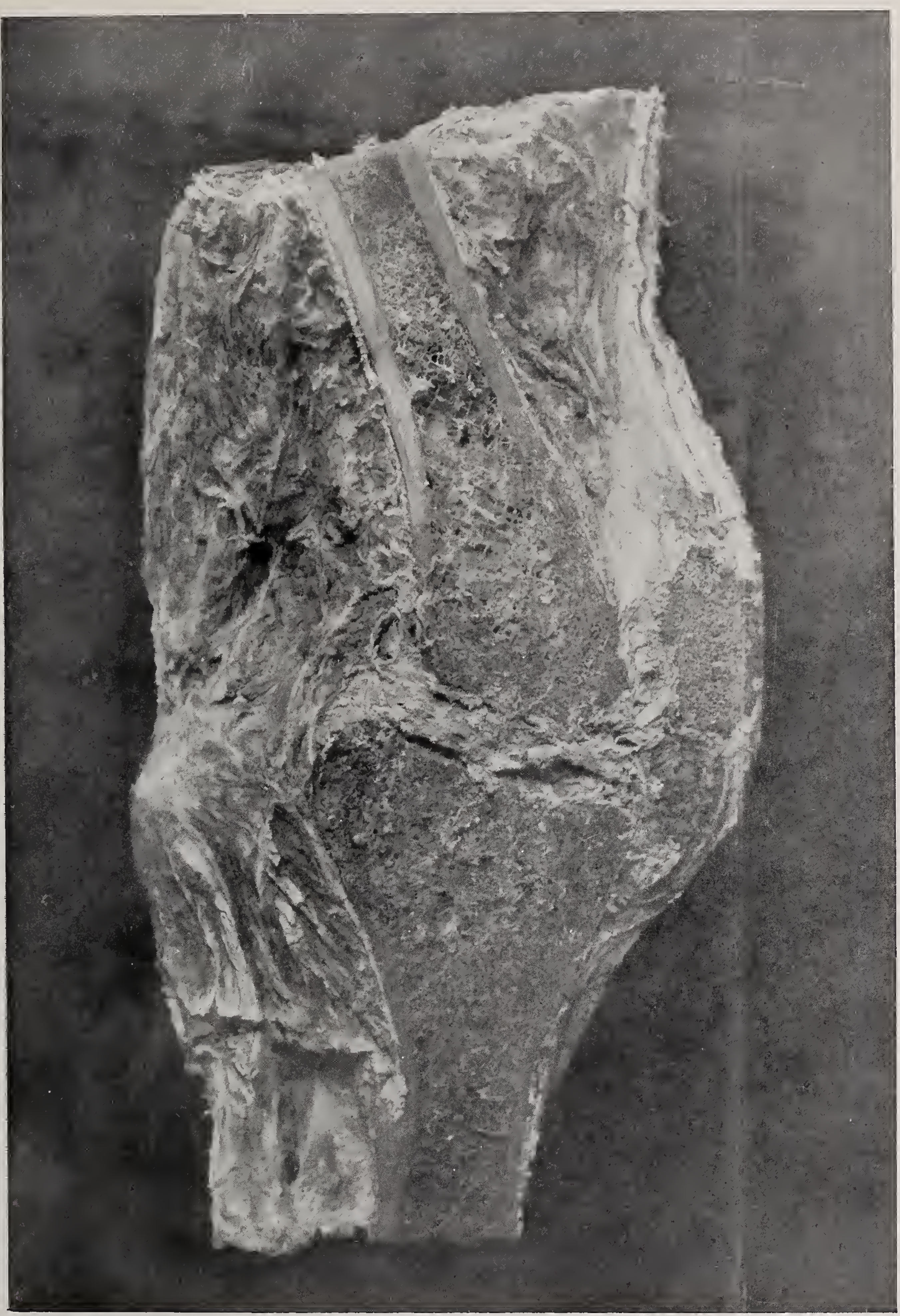


FIG. 96.—Vertical section of left knee-joint, showing extreme degree of fibrous ankylosis. (U. C. H. Museum.)

To face page 484.

knee, flexion is limited, but full extension is possible. In this event periarticular adhesions have developed between the tendinous expansion of the quadriceps and the patella or some neighbouring structure. Hence in such examples extension is perfectly easy, though attempts at flexion are abruptly stopped, while simultaneously sharp pain is experienced at the actual site of the adhesion.

Intra-Articular Bands.—If short and extensive, the slight degree of mobility obtainable will be with difficulty distinguishable from true bony union; but with care, on flexion of the joint, slight mobility, or, failing this, a feeling of springiness, may be detected.

A sensation of resistance is experienced *throughout* the movement, thus contrasting with stiffness due to *periarticular* adhesions, in which the movement up to the limit of range imposed by bands or other extra-articular hindrances is free and unimpeded.

If the fibrous adhesions are longer and less in extent, the arc of movement is more extended, but the execution thereof is attended with growing resistance as the bands become increasingly taut. There is no *sudden or abrupt check*, as in periarticular adhesions—a point of some diagnostic significance.

Muscular Spasm or Contracture.—As to how far the restriction imposed by intra- or peri-articular adhesions is aggravated by muscular contracture or shortening can only be determined by observation of the state of the muscles before and during *anœsthesia.*

If there be present superadded muscular spasm, this will, of course, disappear during anæsthesia, and we shall then be in a position to estimate the limitation of range actually due to adhesions; while if muscular spasm be the sole source of restricted movement, the motion of the joint will be free and unimpeded.

Commonly, however, in these cases, as the result of the long-continued maintenance of an unaltered position, there has ensued an *adaptive shortening* of the muscles. Such contracture often gives rise to a high degree of deformity, but notwithstanding this the joint may yet possess a fair range of motion, such limitation as is present being due to retraction of the muscles on the flexor side of the joint.

Actual shortening of this nature is, of course, uninfluenced by anæsthesia, and very commonly its effects are aggravated by coincident shrinkage of the soft tissues and posterior layers of the joint capsule.

In conclusion, by attention to the foregoing points of differentiation, it is possible to gauge fairly accurately the predominant cause of restricted movement in any given case. It now remains for us to consider, firstly, the propriety of correcting such obstacles, and, secondly, the various methods by which it can be achieved.

Safeguards to be observed before Resorting to Correction.—To begin with, in joints which, although immobile, are fixed in the best possible position, it is advisable to let well alone, especially if the condition is one of long standing. For the etiology of these undifferentiated arthritides is at all times uncertain, and it is, therefore, quite possible that we may rekindle the inflammatory process with little or no subsequent advantage to the local condition.

On the other hand, where a joint like the knee instead of being fixed in extension is flexed, we need have less hesitation, in the absence of contra-indications, in advising our patients to submit to measures for its redress.

Certain other points, however, must be considered before we commit ourselves to any definite course of action—especially any attempts at *forcible rectification.*

Thus, the condition of the articulation requires careful scrutiny, likewise the state of the bones entering into the joint, and of the muscles and soft parts related to it.

State of Articular Surfaces and Joint Capsule.—Bony ankylosis is fortunately rare in these non-suppurative forms of infective arthritis, but its exclusion should be definitely assured, as its existence puts out of court any attempt at forcible adjustment.

Erosion of cartilage, too, happily seldom occurs, but its presence or absence should always be ascertained by skiagraphy, as if present and of large extent, such would negative attempts at forcible rectification, while even, if of slight degree, the results obtainable by manipulation would be greatly discounted.

On this point we would quote the dictum of Painter, whose numerous operations on these forms of infective arthritis enable him to speak with authority. "Where the X ray does not show such erosion and a little motion is present without muscular spasm, and there is no evidence of acute symptoms, it is desirable to manipulate such joints under an anæsthetic, carefully stretching out contracted tissues and breaking up adhesions. If erosion exists, the outcome will not be as good as if there were none, but in many cases manipulation is the best treatment."

The *state of the joint capsule* is also important, as obviously, if it be extensively infiltrated, the results of any attempts at adjustment will largely depend on how far such thickening can be dissipated.

Distension of the joint cavity by oxygen as a preliminary to

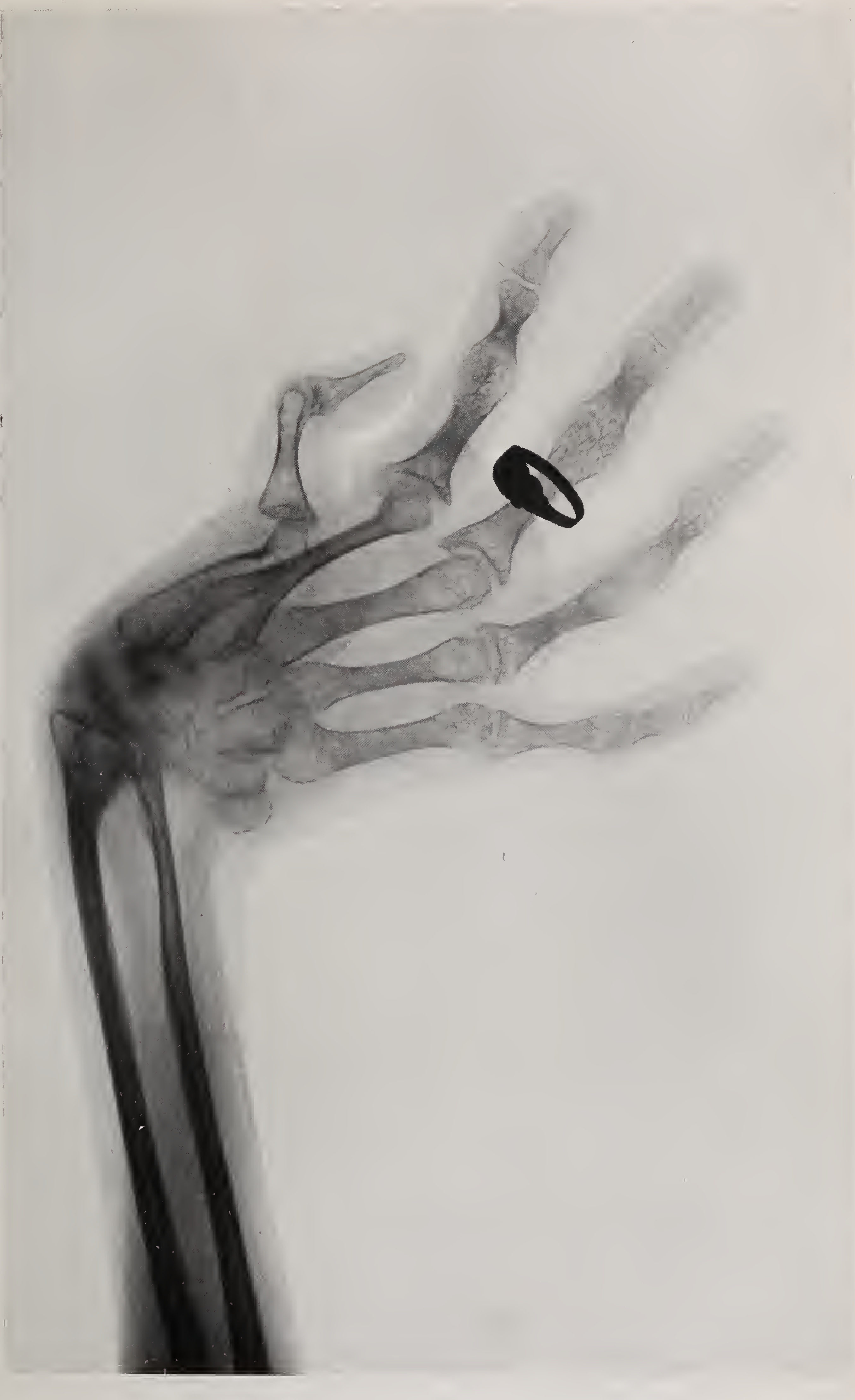


FIG. 97.—Skiagram of case referred to in text. The condition was one of atrophic arthritis. The wrist was fixed in the position shown. Note extreme atrophy of the shafts of radius and ulna.

X-ray examination has been found of value in revealing states of partial or complete obliteration of the joint sheath, existence of which would, of course, render anything short of an open operation futile. Hoffa, who practised insufflation of oxygen extensively, held that, apart from its value as a diagnostic aid, it might prove a valuable accessory to treatment. Thus the distension of the capsule might tend to check its inherent tendency to shrinkage and the agglutination of its articular surfaces, while incidentally it might prove of bactericidal value.

Relationship and State of Bones entering into Articulation.—In the case of the knee it is highly important that we should ascertain whether *the patella is freely movable on the femur.*

Otherwise, if the patella be fixed low down on the thigh-bone, it may present a mechanical obstacle to full extension, or, worse still, it may during the attempted forcible rectification sustain a fracture.

Also it is essential to note whether the normal anatomical relationship between the femur and the tibia is still maintained, or whether some degree of *backward displacement* of the latter is present.

This is important, as, if in attempts at replacement undue force be exercised, a posterior subluxation may occur.

The condition of the bones, too, must not be overlooked, as not infrequently a *contingent atrophy* follows prolonged fixation of a joint. Thus, an instance recently came under our notice which exemplifies the desirability of taking a skiagraph in any case of joint stiffness of long standing and attended with much muscular wasting.

In the example under notice the wrist joint was acutely flexed, and forcible rectification had been deemed advisable. An X-ray examination, fortunately, was previously undertaken, and disclosed such extreme thinning of the radius and ulna that, doubtless, had the endeavour been made, fracture of these bones would probably have ensued rather than a restoration of the desired mobility in the wrist.

In another instance with ankylosis in the knee we witnessed the occurrence of fracture of the femur, while the stiffness of the joint was unrelieved.

State of the Muscles and Soft Tissues.—Muscular wasting in these cases is often of high degree, and with it is frequently associated muscular rigidity. With regard to this latter, if it be due merely to *spasm*, forcible rectification is not contraindicated; but if there be present *actual shortening*, then the case is unsuitable.

It is in these cases of acutely flexed knee, with retraction of tendinous, fascial, and subcutaneous tissues on the posterior surface of the joint, that disastrous results occasionally follow attempts at forcible replacement.

We have ourselves known rupture of the popliteal nerve occur, and Locke and Osgood record rupture of the artery as well, with subsequent gangrene, while Hoffa emphasizes the danger of fat embolism after such procedures.

Methods of Rectification.

The desired ends may be obtained either by sudden or forcible means, or we may adopt some mode of gradually overcoming the obstacle, or, lastly we may resort to some open operation.

In regard of *sudden* or *forcible* methods, they may, when decided upon, be advantageously preceded by a course of massage and passive movements, and these in sequence to hot-air baths or douches.

The cases most suitable are those in which considerable mobility is present, and the restriction takes place suddenly and often in some particular direction. Examples of this nature are usually due to *periarticular adhesions*, either capsular or extracapsular, and are eminently suitable for forcible rupture of the restraining bands, either with or without an anæsthetic.

Only rarely, however, in the types of arthritis under consideration, do we meet with instances of simple and uncomplicated periarticular adhesions, as in the majority of instances the stiffness and malposition are largely due to spasm or retraction of muscular as well as subcutaneous and fascial tissues, with or without associated changes in the synovial membrane, cartilage, or bone.

In such examples forcible rectification is, of course, contraindicated, as a reactive arthritis will almost certainly ensue, while even passive movements are not free from the possibility of such an untoward contingency.

Cases suitable for Gradual Rectification.—If the radiogram show an absence of any cartilaginous or bony erosion, and the joint enjoys a fair though limited range of movement, we cannot do better than follow the plan advocated by Mr. Robert Jones in the following very explicit quotation: "Given a case, then, which has run a non-destructive course, and which possesses, say, 20 degrees of movement, we mould an angular splint of 30 degrees and lightly bandage the limb to it. In a day or two we shall have increased the flexion of the knee from 20 to 30 degrees, and the knee should be kept for a week or two resting in its new position. The splint should then be removed for certain hours, and if in a few days the patient has made a permanent gain of 10 degrees, and possesses a range of 30 degrees instead of that of 20 degrees, we can proceed on similar lines to the acquisition of more. By this experiment we first of all stretch tissues, and by resting the limb we combat the reaction."

Mr. Robert Jones rightly remarks that the recognition of this principle is not conspicuous in textbooks, and comments on the great practical value of this gradual procedure, for in this way we can in these stiff or nearly stiff knees, whose early history is often obscure, safely proceed to discover whether a mobile joint is obtainable.

As an alternative to the foregoing, these cases may be treated by *weight extension*, and the muscular spasm of the related hamstrings in this way overcome, unless actual adaptive shortening of these structures has ensued. In the latter event *exposure* and *division* of the hamstring tendons may be necessary to overcome their resistance to extension.

If, in contradistinction to the foregoing less severe forms, the skiagraph, when taken, discloses a loss of substance in bone and cartilage, with resultant extensive and firm fibrous adhesions between the articular surfaces, so that only slight springiness is detectable on attempts at passive movement, then the position must be reconsidered.

For under these circumstances, attempts at sudden rupture will by reason of the solidarity of the adhesions often prove futile, and the trend of modern surgical opinion in these cases is to resort to open operation for relief of the malposition and stiffness.

There are, however, some authorities who advocate trial of a traction splint, such as Hoeftcke's, but only after the associated muscular spasm has been overcome by weight extension, or shortening of the tendons, if present, relieved by tenotomy.

We may, moreover, be less apprehensive of advising forthwith an open operation in these cases, as Mr. Robert Jones has recently affirmed that the correction of deformities in these *infective or septic arthritides* may be safely embarked upon even during the presence of active disease, provided the fixation of the parts be secured immediately after its performance.

The various operations that have been performed include osteotomy, excision, erasion, and arthroplasty.

Osteotomy is a measure indicated for the correction of a flexion deformity of the knee, which is of too firm a nature to admit of either forcible or gradual rectification. It has been frequently performed in infective or septic arthritis of this articulation.

In the matter of technique it is highly necessary that the wedge of bone removed should be just enough to bring the femur and tibia into correct apposition with the limb in a straight line. For otherwise, if too much bone be removed anteriorly, a condition of genu recurvatum will result, with stretching of the popliteal vessels; while if insufficient coaptation be secured posteriorly, the weight-bearing capacity of the limb is deficient.

Not only *during* the performance of the operation, but even in the *after-treatment* is it necessary to be alive to its effects on the popliteal vessels. For in the former event they may be severed, and during convalescence, if a very acute flexion deformity have pre-existed, it is desirable that the limb for the first few days be slightly flexed, as otherwise the popliteal vessels or nerves may be unduly stretched, and *trophic* disturbances of a serious character supervene.

Excision of the joints has been performed for the correction of faulty position and for the relief of severe and obstinate pain.

In other instances *erasion* or complete extirpation of the diseased joint capsule and ablation of the secondarily involved cartilages have been practised, with the object of removing the whole area of disease, and at the same time correcting the malposition.

Apart from these operations of excision and erasion in the knee, mobility in the elbow-joint has been improved by resection of the head of the radius, and flexion deformity of the wrist by the removal through a dorsal incision of a portion of the carpus.

In cases of firm fibrous ankylosis of the hip in a position of adduction and flexion an *osteotomy* is indicated. If the degree of flexion be extreme, the transtrochanteric route is preferable. For if a subtrochanteric osteotomy be performed, it has the disadvantage that the proximal portion of the femur, being strongly flexed by the attached ilio-psoas, projects awkwardly in Scarpa's triangle.

Both of these operations must be accompanied by *subcutaneous tenotomy of the adductors*, and immediately after the operation traction should be applied by means of pulleys, and the limb placed in an abduction splint, where it remains for some weeks until bony union is effected in this position.

Often in these cases both hip-joints are similarly ankylosed and malposed. In this event the dual requirements have been successfully met by performing an osteotomy on the one and a pseudarthrosis or *arthroplasty* on the opposite hip.

In regard of this last procedure devised by Murphy of Chicago, the surgeon aims at securing an imitation of, or substitute for, the normal joint surfaces by the interposition of pads of fat, fascia, or muscular tissue. It has been utilized in regard of the hip, shoulder, knee, elbow, wrist, as well as the lower jaw, in instances in which one or other of these joints has become ankylosed as a result of infective or septic arthritis.

The operation has been performed in cases of fibrous as well as of osseous ankylosis, and involves exposure of the articular ends and their remodelling or resection. Subsequently there is interposed a pad of fat and fascia or muscular tissue, this intervening cushion being either free or attached to some neighbouring tissue.

According to Mr. Robert Jones, the results obtained in the case of the *hip*, *elbow*, and *wrist* are most encouraging; but in the case of the knee, owing to its dependence on ligamentary support, the desirability of replacing stable bony ankylosis by one of unreliable character is distinctly doubtful.

In conclusion, it is clear that, thanks to the labours of our surgical confrères, the outlook for these deformed and crippled patients is becoming distinctly brighter; but, obviously, the cases for operation should not only be carefully selected, but performed by those of especial experience in this department of surgery.

Chronic Fibrous Rheumatism.

In regard of the *localized articular types*, every effort should be made to arrest the progress of the morbid process, which, fortunately, advances with extreme slowness. Local measures in this variety must be considered as entirely subsidiary to correction of any constitutional fault or tendency.

These, in the earlier stages, resolve themselves into the relief of pain, when present, by means of analgesics, and the promotion of absorption of newly-formed inflammatory products by means of iodine-containing substances.

In the later stage of sclerosis, the use of local packs, vapour or hot-air baths, as well as douches, in accordance with the principles laid down, will be of value, especially if reinforced by massage and passive exercises to restore suppleness to the affected joints.

In the *fascial type*, the measures to be adopted for the correction of the deformity will be dictated by their degree, character, and duration.

In the initial stages there is some scope for *prophylaxis*, and to this end local massage of the parts, reinforced by the nightly application of splints, may do much to restrain the tendency to flexion.

It need hardly be said that nothing short of their use for a prolonged period will prove satisfactory, and the tendency to recurrence, always present, must be met by vigilance as constant on the part of the subject.

Should, as is very commonly the case, the occupation of the subject favour the production or aggravation of the deformity, then it must either be wholly forsaken, or means taken to minimize the localized pressure on the palm which is so harmful.

In lace-workers, Collis and Eatock have suggested certain prophylactic measures, in regard of which their Home Office Report may be profitably consulted.

In more advanced cases, *division of the bands* either subcutaneously or by the open operation is called for. Even then when the wounds have subsequently healed, manipulation and nightly splinting will have to be persevered in for many months if a recurrence of retraction is to be avoided.

Where the deformity is extreme and of long standing, even complete excision of the fascia and section of the tense tendons as well as the anterior ligaments of the joints may prove futile, owing to profound involvement of the bony and ligamentary structures by the morbid changes.

Rhumatisme Chronique Fibreux.

Having dealt at such length with the principles that should guide us in the treatment of joint disorders, it is unnecessary for us to particularize in this most deplorable form of so-called "chronic rheumatism." Its inveteracy and its *polyarticular* distribution alone distinguish it from those undifferentiated types of infective arthritis with which we have been dealing.

If there be one point that needs emphasis, it is the desirability of early diagnosis, as only by this means can we hope to secure a timely adoption of those measures calculated to obviate or minimize the distortion and deformity which confer on it its clinical facies.

In the acute stages, we should not merely content ourselves with relieving the pain in the joints, but should endeavour also to secure them in what may be regarded as a *good surgical posture*, for there is little doubt that by timely and incessant attention the tendencies to malposition might be very largely controlled. At the same time we should be fully alive to the large rôle played by massage, active exercises, hydrotherapy, and other measures in promoting the absorption of the inflammatory products, and restoring normal pliancy and suppleness to the affected tissues, when such have undergone organization.

CHAPTER XXXIV

MUSCULAR FIBROSITIS

Local Therapy.

The principles of treatment are precisely similar to those advanced in regard of the articular type of fibrositis.

They consist in—(1) the relief of pain and stiffness; (2) the absorption and removal of inflammatory products; (3) the prevention of continuance or recurrence of the morbid process.

Though a hard and sharp division between the acute and chronic types of muscular fibrositis is impossible owing to the existence of endless transitional forms, still, our therapeutic procedures must, of course, be modified according to the intensity of the inflammatory process.

Acute Types.

Relief of Pain.

As emphasized in the clinical account, the pain is not spontaneous, but *evoked by movement or passive extension* of the affected muscles. From this peculiarity we derive the primary indication for its relief—*i.e., rest or relaxation of the implicated structures.* Indeed, quietude is of the first importance, as the sensitiveness of the nerve endings is fostered and intensified by the slightest increase of tension in the inflamed muscles.

Here, however, we must for a moment revert to the very prevalent view that an attack of acute muscular fibrositis, if taken at its very onset, may be cut short or aborted by the opposite extreme—viz., active exercise.

This happy result, however, is rarely achievable in primary seizures, but only in those recurring forms in which the patient, through long experience, is able to recognize certain prodromal symptoms indicative of the imminence of an attack. The success of such measures will depend on whether the exercise does or does not involve direct use of the affected muscles, and whether it be sufficiently strenuous to evoke profuse perspiration.

Thus, if the pain or uneasiness of an oncoming seizure of lumbago be not markedly aggravated during walking or standing, it sometimes happens that the subject, as a result of a brisk walk, while heavily clothed, may abort the attack, provided he be lucky enough to escape a chill during the process.

Doubtless the occasional success which follows this somewhat heroic method is directly due to reduction in toxicity of the plasma by profuse diaphoresis. But it is perfectly futile unless undertaken at the very onset, and, indeed, if postponed for two or three days, infallibly aggravates the malady.

Rest and Fixation.—Whenever possible, repose in bed should be enjoined, this being an important element in promoting a rapid cure. To secure immobilization, strapping or firm bandaging of the affected parts should be undertaken, the former being preferable when the patient, either from choice or necessity, has to be up and about.

In pleurodynia the pain is sometimes completely relieved when the thoracic excursions on the implicated side are controlled by broad strips of brown holland plaster fixed firmly round the chest at the end of an expiratory effort.

In the same way, the pangs of lumbago may be strikingly abated by strapping so applied as to partially fix this portion of the spine.

When, as frequently happens, lumbo-sacral or gluteal types of fibrositis are complicated by sciatic pain, not only the loin, but the buttock and thigh, should be strapped or encased in cotton-wool and firmly bandaged.

In abdominal fibrositis, if localized to the lateral muscles, strapping of the affected side may suffice, but where the anterior muscles are involved a roller bandage round the abdomen is more convenient.

In stiff-neck a thick layer of cotton-wool or gamgee tissue, snugly encircling the neck, lessens the chance of unguarded movements.

Lastly, in all forms of brachial fibrositis absolute and early immobilization, pending the decline of the acute stages, is imperative. For but too frequently the requisite rest is not resorted to when most urgently needed and productive of most good—viz., in the initial stages.

It is important to recognize the fact that, although movement at this period often causes but little pain, nevertheless its performance fosters and kindles to greater intensity the morbid process.

We have no doubt that the inveterate course of these cases would be sensibly abridged if the patients refrained from their ill-advised persistence in using the affected limb.

At the very onset, therefore, the arm should be carried in a sling so applied as to give complete rest and support to the implicated muscles, and, to lessen disturbance of the parts, the clothing so arranged as to make dressing and undressing easy.

Nor should this enforced repose of the limb be too readily relinquished, but only when pain and tenderness have largely, if not wholly, subsided.

In conclusion, for these *acute* forms of muscular fibrositis quietude is as essential as it is for *inflamed joints*, for the evil effects that follow neglect of this precaution are as serious in the one case as in the other. The constant irritation of the inflamed structures lessens the chance of speedy and complete resolution, and favours organization of the inflammatory products, with increased liability to recurrence. Nor is this all, for how often does a deltoid or a gluteal fibrositis, carelessly or casually treated, give rise by extension to an obstinate brachial or sciatic neuralgia or neuritis! This being so, rest and fixation should invariably take precedence of all other measures directed to the relief of pain and curtailment of the inflammatory process.

Thermic Applications.—When the subject is confined to bed, dry heat in the form of warm local packs, rubber bottles, hot sand, or bricks is next to fixation the most valuable means we possess for assuaging the pain. Of course, whenever feasible, a local hot-air or light bath should be invoked, and, for the shoulder especially, intensive irradiation by means of a leucodescent lamp is most soothing.

Or the old-fashioned plan of pressing the painful part with a flat-iron, the skin being covered with two or three thicknesses of brown paper, may be tried. A few applications of this sort are undoubtedly of great value in lumbago and other types of fibrositis.

As Fuller remarked, it seems more effectual when the pain, at any rate in lumbago, is definitely *neuralgic and unaccompanied by constitutional disturbance.* He held it to be absolutely useless in the type marked by scanty, loaded urine, costive bowels, and other symptoms of functional derangement, preferring in this case to rely on dry or wet cupping of the loins.

Moist Heat.—When efficient nursing is at hand, local steaming or fomentations may be applied several times daily to the painful muscles, the parts in the interval being covered by cotton-wool, mackintosh, and a firmly-applied flannel bandage. Or a thick layer of antiphlogistine or kaolin may be used, and very useful are they in torticollis, pleurodynia, and so forth.

Acupuncture. — In regard of this old-fashioned remedy, although we, in common with others, have found it dramatically effectual in giving relief in some cases of lumbago, yet its disagreeable nature, and, more pertinently, its uncertain action, have led us to largely relinquish its employment. Ordinary hat-pins, if sterilized, serve admirably, and, according to the area of pain, one or several needles should be plunged deeply into the affected muscles, and allowed to remain *in situ* for one or two minutes. The relief obtained is probably due to the release of serum effused beneath the deep fascia, this diminishing tension.

Aquapuncture.—Intramuscular injections of a few drops of sterilized water have sometimes been followed by success, but this, like the hypodermic injection of morphia, cocaine, antipyrine, and other substances, is only very rarely called for, and should certainly never be undertaken until other analgesic measures have failed.

In the vast majority of instances the pain relents swiftly to the application of dry or moist heat in conjunction with external medicinal applications, to the consideration of which we now pass on.

Anodyne Applications.—The variety of these is protean, and they may take the form of pigments, liniments, ointments, or medicated plasters. In the more intense cases, with great local sensitiveness, the following preparations may be lightly applied to the affected area by means of a brush. Thus, we may use anodyne colloid, collodium, or glycerine of atropine or belladonna, subsequently covering the parts with warm moist dressings or spongiopiline enveloped in oiled silk, cotton-wool, and a flannel bandage.

In using atropine preparations, however, care must be exercised, as absorption through the unbroken skin may readily cause toxic symptoms.

Equally efficient as local anodynes are the following preparations:

℞	Chloroformi belladonnæ, B.P.C. ..	1 drachm.
	Linimenti belladonnæ	ad 1 ounce.
vel ℞	Linimenti belladonnæ Linimenti chloroformi Linimenti aconiti	partes æquales.
vel ℞	Linimenti methylis salicylatis (Martindale).	

These preparations should be applied on lint saturated with the solution, and overlaid with gutta-percha tissue, cotton-wool, and a bandage, as used in this way they exert a powerful revulsive and analgesic effect. In less acute types, or as local sensitiveness declines, various ointments may be gently rubbed in over the affected area, and in this way the beneficial effects of *massage* superadded.

For this purpose ointments containing methyl salicylate in hydrous wool fat, with or without menthol, are most suitable, or the methyl salicylate may be mixed with equal parts of olive-oil and applied with friction. Used in this way it is rapidly absorbed, and is much to be preferred to the natural oil of wintergreen, which not infrequently proves very irritating to the skin.

Where the patient is not confined to bed, porous or medicated plasters often give great relief, especially if supplemented by firm bandaging. Belladonna or opium plasters are those most commonly favoured, but those containing menthol or methyl salicylate are equally efficient, especially the former.

Under the influence of one or other of the foregoing methods, the pain in these acute forms of muscular fibrositis is usually quickly subdued. Occasionally, however, owing to incomplete absorption of the interstitial inflammatory exudate, the case proves more obstinate, and a variable degree of pain and stiffness lingers on in the affected muscle.

To Promote Absorption.

If means permit, the ideal course to pursue is for the patient to be sent to some spa, where, conjointly with general treatment, he may enlist the advantages of hydrotherapy, massage, and so forth. In default of such facilities we must, of course, fall back upon the use of stimulating liniments and embrocations.

Rubefacient and Counter-Irritant Applications.—Of these there are endless varieties, those containing ammonia, turpentine, camphor or capsicum being most in vogue. Inasmuch as their efficacy is in a large part attributable to the rubbing which accompanies their use, we should favour preparations containing oleic acid, either alone or diluted with a fatty oil.

As an oily liniment, perhaps one of the most useful is the linimentum succini co., containing equal parts of the oils of amber and clove, combined with twice the quantity of olive-oil.

Or one of the following excellent combinations may be selected:

℞	Olei origani vel olei terebinthini	partes æquales.
	Linimenti ammoniæ	

In lumbago to be applied with friction to the affected part.

vel ℞	Ætheris	1 drachm.
	Linimenti belladonnæ	½ ounce.
	Tinct. capsici	to 2 ounces.

To be well rubbed in to painful parts night and morning.

For pleurodynia the following is an excellent liniment:

℞	Lin. saponis co.	3½ drachms.
	Lin. camph. co.	3½ ,,
	Tinct. belladonnæ	3½ ,,
	Olei cajuputi	1½ ,,

To be applied with friction.

In stiff-neck and rheumatic cephalalgia, the following combination is very serviceable:

℞	Ovi vitelli	one.
	Spiritus camphoræ	½ ounce.
	Olei terebinthini	1 ,,
	Acetum	to 12 ounces.

To be well rubbed in behind the ears and into the neck.

The parogenum terebinthinæ, B.P.C., or that containing camphor and menthol in combination with oleic acid, are also very effectual, and in obstinate cases the liniment or oleoresin ointment of capsicum may be rubbed in, but not too vigorously, as it sometimes proves too strong for tender skins.

Where there is fixed pain with definite thickening, more especially of the *periosteum*, blistering often affords relief and hastens absorption. Vesication is rarely called for in muscular rheumatism, but Osler speaks well of the thermo-cautery as an analgesic agent in this affection.

In the vast majority of instances such drastic counter-irritation is unnecessary, and instead iodine and ichthyol ointments should be perseveringly inuncted for half an hour or more daily. Or, if preferred, iodine or chlorine ions may be introduced by means of ionization, followed by massage.

The degree of success that attends friction or inunction will largely depend upon the skill and persistence with which the rubbing or kneading is performed.

Massage.

To a very large extent, therefore, treatment by external medication has been superseded, and rightly so, by skilled massage, the outstanding advantages of which are now so generally appreciated that there are few towns of any size lacking men and women competent to practise it. It is, we think, regrettable that its aid is not sought more frequently *during the decline of acute attacks,* instead of being reserved, as it very largely is, for recurring or obstinate varieties of muscular fibrositis.

In the latter instance, organization of the inflammatory products has already ensued, and their obliteration is tenfold more difficult, whereas in the former the soft nature of the effused material renders dispersion easier, and, what is more important, minimizes the chances of recurrence.

Personally we have invoked its aid even in the most acute varieties, but here its application demands great skill on the part of the masseur. At this stage the parts, of course, are extremely sensitive, and the greatest gentleness must be exercised to begin with. That this is so was brought painfully home to one of us in his own person. Thus, in an acute attack of lumbago massage was resorted to almost immediately, and with the very greatest benefit, the attack wholly disappearing in a few days.

No recurrence took place, but some years afterwards a similar attack, but involving this time the clavicular bundle of the trapezius, was experienced. Massage was again enlisted, but on this occasion was performed by another and very inferior masseur. The result was far from satisfactory, and, we think, largely attributable to the unskilful and unduly rough manner of its execution, which undoubtedly aggravated the inflammatory process, and led to a prolongation of the stiffness and pain for some two or three months, though previous attacks of the same nature had been rapidly recovered from.

Technique in Acute Cases or Exacerbations.—Here our end and aim is to promote the absorption of exudates, and to diminish spasm or hypertonus in the affected muscle. For this purpose, that particular movement known as "effleurage" is the most desirable, as its effect is to accelerate circulation through the affected area.

It should consist of centripetal stroking employed at first in the lightest and most tentative manner with the finger-tips.

To gain the patient's confidence, it is well at first to encroach but lightly on the most painful spots. As the exudation undergoes absorption, tenderness lessens and muscular spasm relents, and the manipulation should become correspondingly more vigorous and rapid. As with greater tolerance the massage can be conducted more searchingly, it is often possible to locate nodular or diffuse infiltrations hitherto masked by the high degree of muscular spasm or hypertonus. The effleurage, hitherto practised only with finger-tips, should now be replaced by slow stroking with the flat or heel of the hand, and when the affected muscles are overlaid by fascia the knuckles may be used. To attain the wished-for end—the dissipation of the deposits—the effleurage must be supplemented by deep friction and kneading, and this, moreover, should be persisted in until their dispersion has been thoroughly and completely achieved, otherwise the labour is in vain.

In conclusion, many of these acute forms of muscular fibrositis readily yield to massage combined with dry heat, or fomentations and exercises, and personally we have no hesitation in affirming our belief that this combination constitutes the *ideal local treatment* of such cases. For massage is not only curative, but also, what is more important, definitely prophylactic, always provided that the inflammatory exudate into the interstitial tissue has been wholly dispersed.

Systematic Exercises.

In these convalescent cases of muscular fibrositis, it is highly necessary that we should enlist all means to restore tone and freedom to the implicated muscles, and for this purpose exercises are indispensable. They are most advantageously employed at the close of a séance of massage, and at first, of course, should be largely or wholly passive in character.

The most opportune moment for the essayal is often as difficult to decide upon as in the case of inflamed joints. Mere stiffness, far from being a contra-indication, is a direct index of the necessity, but, generally speaking, if they markedly aggravate pain and muscular spasm, continued rest is indicated.

Acute Brachial Fibrositis.—In this affection, for example, passive movements, in our opinion, should not be employed until they occasion little or no pain, and the initial attempts should be gentle and most tentative. Massage, on the other hand, in these cases may be tolerated long before passive movements can be endured.

Where great pain and scapulo-humeral muscular spasm ensue, despite the greatest gentleness, we should always be alive to the possibility that an extension of the morbid process to the subjacent subacromial bursa, with resultant adhesions, has occurred.

But even if this untoward complication can be excluded, it is often extremely difficult to decide how far the spasm induced by attempts at movement is due to real pain or the mere apprehension thereof. For in these often protracted cases the patient, as a result of long-continued suffering, may be so unnerved as to apprehend pain when his fear is groundless. To effect the discrimination, it is essential that the patient's confidence be gained and his apprehensiveness allayed. Then, if the limb be abandoned in complete surrender, passive movements will be capable of performance without pain, but if, notwithstanding acquiescence on the part of the patient and gentleness on the physician's side, pain and spasm ensue, then it may be taken that the inflammatory process is still active, and further rest is indicated.

Once embarked upon, the passive exercises should be systematically carried out, and care taken in these stiff shoulders to prevent vicarious movement of the shoulder girdle.

Especial care should be taken that the movements of passive abduction, internal and external rotation, as well as elevation of the arm, are thoroughly performed, and as soon as possible a course of active gymnastics should be entered upon.

Lumbago.—In this malady, when all acute symptoms have ceased, exercises, first passive, then active, should be performed, the necessity being more cogent if there be reason to suspect a traumatic element, such cases, of course, being more liable to be complicated by adhesions. To restore mobility, therefore, the following movements should be practised once or twice daily:

With the knees kept straight in a standing position, trunk flexion and extension should be performed slowly and deliberately.

While lying supine with the arms by the sides, the body should be slowly raised to the sitting posture, the extended legs remaining in contact with the floor throughout their entire length.

While standing, the trunk should be inclined laterally to either side with and without rotation of the body, and the same movements also performed while sitting.

It is always well, in ordering such exercises, to prescribe the number of times each particular movement should be practised.

Torticollis.—In these cases, although fortunately prompt recovery is the rule, still, if the morbid process be unusually intense or protracted, the patient may develop a list of the head and neck to the affected side. To avoid such untoward consequences, therefore, there should be no delay in resorting to massage with passive exercises, including flexion, extension, and rotation, of the neck.

Inasmuch as acute fibrositis may attack any muscle in the body, it is unnecessary that we should indicate the precise character of the exercises to be undertaken in every variety that may present itself.

Only, in conclusion, we would emphasize the fact that they should be regarded as an essential supplement to massage.

Moreover, their true office is not so much to correct any deformities that may result, but to prevent their development, and this can only be achieved by resorting to them sufficiently early—viz., during the convalescence from acute attacks.

Prevention of Recurrence and Prophylaxis.

While, fortunately, acute muscular fibrositis, at any rate in its initial attack, readily relents to one or other of the foregoing methods of treatment, it is highly important that some attempt should be made to diminish the likelihood of its return.

Local Hyperidrosis.—Thus, these local forms of fibrositis, especially *lumbago,* are often marked by profuse sweating of the skin overlying the affected muscle. This sodden state of the integument, it is important to note, outlasts the pain, and leads very commonly to *local chilling from evaporation,* and thus makes for recurrences. With the decline of the acute symptoms, therefore, we should endeavour to promote a more healthy condition of the skin. To this end the affected area should be rubbed daily with the naked hand, a horsehair glove, or rough towel, after sponging or pail douching of the parts with alternate hot and cold water.

In the intervals, to insure rapid absorption of the perspiration, the parts should be covered with a layer of thermogen or capsicum wool and firmly bandaged. Or, what we have found equally efficacious, a layer of blotting-paper, frequently renewed, may be tacked to the inner side of that part of the vest that overlies the loin or other affected area.

As soon as the tendency to profuse local sweating disappears, such absorbent coverings should be abandoned, and reliance placed on *friction, bathing,* and *suitable clothing* to restore proper tonicity to the overlying skin.

We feel sure that such measures are infinitely preferable to the older method of maintaining constant cutaneous overaction by swathing the parts in flannel bandages, or by applying warm stimulating plasters.

The same hardening process should be adopted in all these localized types of fibrositis. Persons subject to *torticollis* should not be encouraged to wear comforters or mufflers, and those prone to "*rheumatic*" *headaches* should on no account sleep with the head covered with a nightcap or buried in too soft pillows.

By such habits is their susceptibility to atmospheric changes aggravated, and instead they should endeavour to diminish the sensitiveness of the parts by daily friction of the head and neck with a mit wrung out of tepid or cold water, afterwards well drying the region with a coarse towel.

Similar considerations will guide us in regard of other types, the keynote being to raise the resistance of the local cutaneous covering, and not to overcoddle it.

Other Prophylactic Measures.—Persons prone to *lumbago* should be counselled to avoid remaining for any length of time in a strained position, especially if only partially clothed, and therefore exposed to draughts, as in dressing or shaving. It is also wise of them, if they shave while standing, to have their mirror placed at such a height as to permit of a fully erect position. Failing this, they should sit while shaving.

The operation of pulling on the boots is frequently, also, provocative of an attack, and here either the services of another person must be enlisted, or a boot-hook employed with a shank so long that the trunk and thigh may be as nearly in a line as possible when the tug is made.

Where the patient's occupation involves stooping, inquiries should be made as to the mechanical conditions under which the work is prosecuted—viz., is the desk or bench of a height involving undue or avoidable strain upon the muscles ?

In so-called "rheumatism" of the shoulder, too, this mechanical factor is of the highest importance, and the same investigation is requisite, as these static factors often intrude their influence, and their correction should form a part of rational treatment and prophylaxis.

In conclusion, it must be thoroughly understood that, though all these measures to prevent recurrences are highly important, still, the degree of their efficacy will be almost directly proportional to the thoroughness with which the basal causes of recurrences—*i.e.*, nodules or infiltrations—have been dealt with by massage.

Chronic or Recurring Forms of Fibrositis.

In these more severe or inveterate types of fibrositis, the prolongation or oft recurrence of the morbid process leads to *organization of the inflammatory exudate into the interstitial tissues.* The main object, therefore, of local treatment is to effect the *obliteration or dispersion of the thickenings or infiltrations*, which permeate the muscular structures as well as, frequently, the aponeurotic and subcutaneous tissues.

The chief and, indeed, the indispensable agent is, of course, *massage*, supplemented by hydrotherapy, hyperæmia, and electrical treatment.

Massage.

Sir William Temple, a sufferer from gout, is said to have remarked: "No man need have the gout who can keep a slave."

He referred, of course, to massage, or, as he termed it, "friction"; but his succinct observation is even more applicable to "muscular rheumatism," whose treatment and prophylaxis are unattainable without its aid.

It is, indeed, in massage that the only method of cure in these cases can at present be found, and the results of scientific rubbing in this affection are so decisive that its consideration calls for some details.

Preparation and Technique.—It is always advisable that the patient should undress in a warm room with a temperature of 65° to 70° F., while an extra blanket or shawl should be at hand to insure all parts being duly covered save the area to be manipulated. As ordinary beds are usually of inconvenient height, a suitable couch should, whenever possible, be taken advantage of. Furnished with an adjustable back and foot rest, it should be well padded, and not exceed 2 feet in width or 26 inches in height; for it is very desirable, not only that the subject should be comfortable, but that the masseur also should not be inconvenienced by having to work in a cramped or strained posture.

Position of Patient.—Inasmuch as it is essential that the parts to be massaged be thoroughly relaxed, some care must be taken in selecting the posture to be assumed by the patient.

When the head, neck, or shoulder is to be operated on, he should be seated on a stool allowing free access to these parts.

If it be the leg or forearm, these should be thoroughly supported throughout their entire length.

When dealing with the back, loins, or gluteal regions, the subject should lie on his face with the arms straight by his sides, and the palms turned upwards. Or, what is more comfortable, he may lie with his elbows out and hands beneath his forehead. In both instances a cushion should be placed under the abdomen to relax the dorsal muscles.

Some people object to the prone position, and in such event the subject should lie first on one side and then on the other, and in this way both sides of the back may in turn be massaged.

In thoracic or abdominal massage the patient must, of course, assume the supine position, and in the latter instance, to obtain the necessary relaxation, the head should be raised upon a pillow and the knees bent.

Use of Lubricants.—The question as to whether or not dusting-powders or oleaginous substances are employed will depend very largely on the masseur himself. Given dry, soft hands on the part of the rubber, with a sound knowledge of technique, there is but little danger of causing rashes or abrasions. Where the rubber's hands or the subject's skin is moist, the parts may be dusted with smooth talc powder. The latter is certainly more cleanly than ointment, allows of a better grip and a more delicate touch.

When the patient's skin is sensitive, very dry, or there is great emaciation, some greasy application may be necessary, and scented hog's lard in our experience is very efficient, or, if preferred, neat's-foot oil, lanoline cream, or liquid paraffin, may be utilized.

Some authorities highly commend unguentum de Fioraventi, but, beyond æsthetic reasons, it does not appear to present any special virtue.

If ointments be used, they should be applied sparingly, as, though they may not interfere much with the performance of gliding movements, such as effleurage, they undoubtedly dull tactile sensibility and impair the efficiency of the grip for deep kneading.

When the patient's skin is extremely hirsute, the hair should either be cut off or, failing this, be sprinkled with powder.

Before leaving this question of lubricants, it may be mentioned that, while wide differences obtain as to their employment for actual massage, there is no doubt that preliminary smearing of the skin with some oily preparation much facilitates *the detection of nodules or thickenings* by palpation.

Apropos of this, too, it is, we think, advisable that the physician himself should locate their site before ordering massage, as otherwise the rubber may be misled by referred pain, and wholly overlook the actual location of the deposits. Vague directions for massage in these cases are useless, and for ourselves the only plan that we find effectual is that the physician himself should establish their site, and, moreover, should satisfy himself that the masseur also appreciates their position, and realizes what is required of him.

Nature of Case.—While in the acute and subacute stages the soft tissue material is readily dispersed, in the *chronic* forms the density of the fibrous formations, though it permits of more strenuous massage, yet by reason of their more resistant nature the task in their case is rendered far more difficult of achievement.

In acute cases, a few séances, chiefly of effleurage, may suffice, but in these severe varieties all the varied manipulations will have to be enlisted.

The aim and object of massage in these cases is to facilitate the dissipation of exudation, nodules, or thickenings, and at the same time to promote their dispersion by accelerating the local circulation.

To the value of effleurage as a circulatory excitant we have already alluded, and all that we need here remark is that every séance of muscle massage should begin and end with a few minutes of these stroking manipulations.

The direct crushing and removal of deposits and thickenings is, however, only to be achieved by means of friction and pétrissage, or kneading.

Friction is performed with the finger-tips and thumbs, which with little circular movements are insinuated deeper and deeper into the affected area, the manipulations being much more effectual when the parts can be pressed against the underlying bone or are otherwise efficiently supported.

Closely allied to this are the movements of *pétrissage* which, however, can only be employed when the muscles to be acted upon can be raised either between the fingers and thumb or between the two hands. In this way the flexors of the extremities and the clavicular bundle of the trapezius, both favourite sites for indurations, may be lifted up and kneaded throughout their entire length.

When skilfully performed, the skin is not dragged upon, but moves with the hand as the grip upon the contained tissues is alternately tightened and relaxed. For the detection and location of deposits, as well as for their dispersion, this movement is invaluable.

Tapotement has for its object mechanical excitation of the muscles by means of blows delivered either with the palm, the ulnar edge of the hand, or knuckles.

In a complete séance of muscle massage, all the foregoing movements are invoked, and usually in the order described.

The success of massage will depend partly upon the anatomical site of the nodules, and partly upon the degree of skill with which these varied movements are adapted to the special requirements of individual cases.

Where the affected muscles are easily accessible to pétrissage, or where the nodules can be firmly pressed against bony structures, their attrition and dispersion is, of course, more easily compassed, but those deep-seated or covered with dense and infiltrated fasciæ are more difficult to obliterate.

In some of these chronic types, the detection of definite nodules may at first be impossible, but, as Stockman has pointed out, after a few days' treatment the thickenings become more tender and defined. If, however, the massage be persevered with, this sensitiveness declines, and the deep kneading and friction may be applied with more and more force. In some cases the wished-for end is attained with surprising rapidity, but in other instances only after long and assiduous labour.

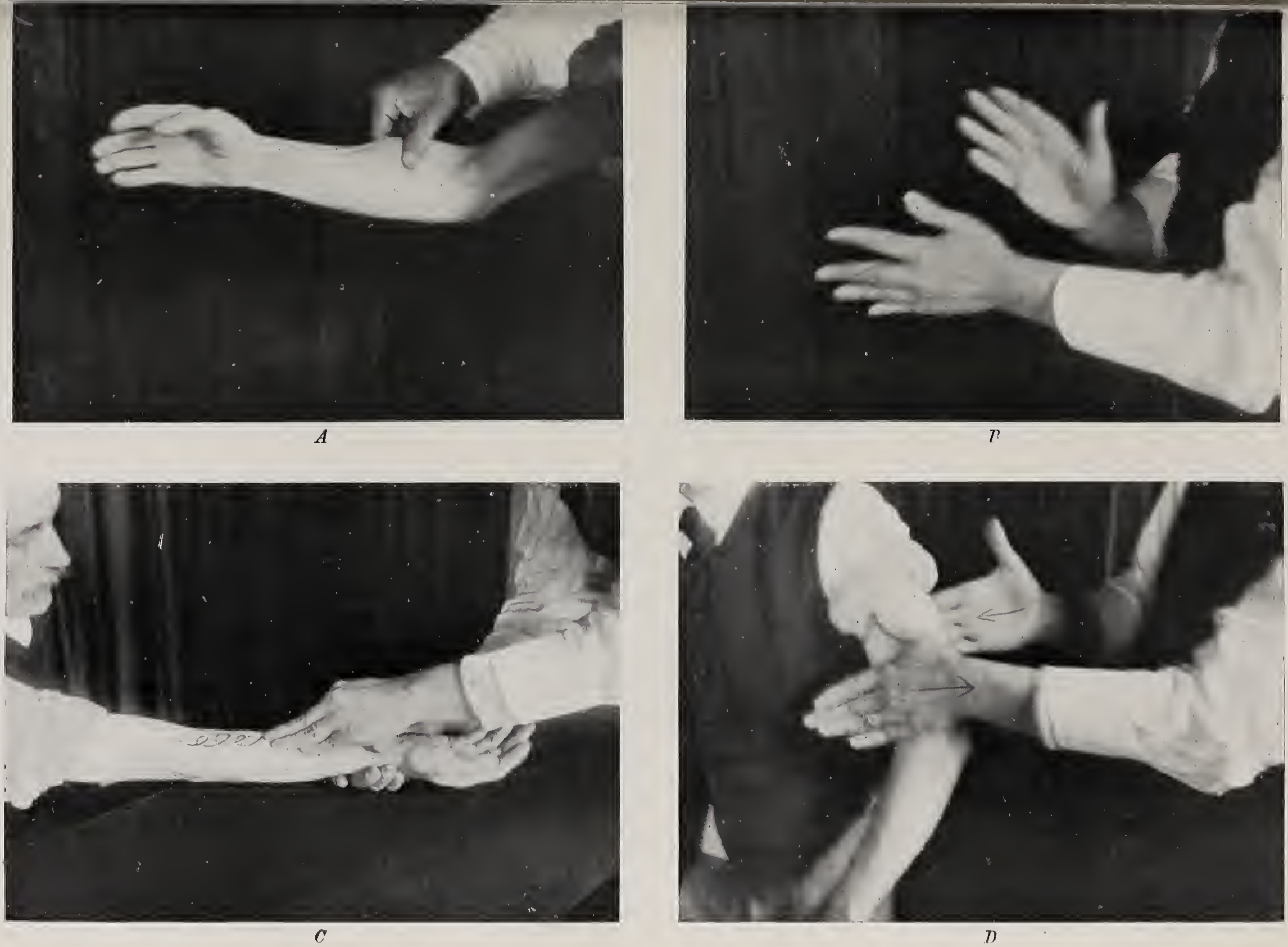


FIG. 98.—Plates illustrative of types of movement practised in massage. *A*, Petrissage; *B*, tapotement; *C*, effleurage; *D*, friction with rolling.

To face page 506.

Indeed, in some instances with deep-seated and very resistant nodules, we have found *vibratory massage* by means of a steel ball driven by an electric motor necessary to effect their obliteration, and some excellent masseurs for this purpose use coverings similar to the so-called "knuckle-duster." While not in any way advocating excessive roughness, it is often impossible to avoid bruising in inveterate cases.

As regards the duration of each séance, the length, like the force with which the manipulations are exerted, should be gradually increased from one-quarter to three-quarters of an hour.

Inveterate cases may take weeks and months of massage, and it is to be regretted that the necessary expense so frequently results in its premature abandonment. If, however, it can be persevered with until the initial sensitiveness has worn off, and the site of the nodules is quite clear, then the deep friction or kneading may be continued, if accessible, by the patient himself, or otherwise by some intelligent person.

Probably the ideal results of massage in fibrositis will only be fully realized when its routine employment in *initial* stages, by preventing the consolidation of the interstitial exudate, will have deprived the disease of its chief impetus to chronicity.

In conclusion, we would urge the importance of more interest being taken by the physician himself in the technique of massage, as from personal experience we are assured that, rationally and perseveringly practised, it would bereave muscular fibrositis of its most dreaded complications.

Hydrotherapy.

As experimental evidence has shown, by means of douches at different temperatures the circulation through muscles can be controlled and their functional efficiency thereby increased.

Though unsuitable for the acute stages, they are of the greatest value in the *subacute* phases and in *chronic or recurring* types.

The ends for which they are employed are the relief of pain and stiffness, and the dissipation of exudates.

Relief of Pain.—Where superficial tenderness is very marked, and a percutient effect is undesirable, we may apply a hot steam douche. If this be unattainable, a hot fan or spray douche may be employed, and gradually, as the parts become more tolerant, a broken jet or percussion douche may be substituted. In this way, by careful graduation, pain is relieved and muscular spasm lessened.

If none of the foregoing measures can be employed, local affusions of hot water delivered from a pail are readily administered in any ordinary bathroom, and these, like the former, may be advantageously followed by brisk rubbing with the hand or coarse towel, or, if available, skilled massage.

For relieving the pain and spasm in muscular fibrositis, the local Scotch douche deservedly enjoys a very high repute. It is especially valuable in *lumbago*, *pleurodynia*, and *fibrositis of the limbs*, and it may with advantage be preceded by a vapour, hot-air, or electric-light bath.

The hot applications should continue about three to four minutes, and the cold three to thirty seconds, and for the purpose a fan or spray douche is usually enlisted.

In sensitive patients it is well that the transition from hot to cold should not take place too abruptly, and in their case it may be carried out gradually, occupying one-half to one minute. Slowly, as tolerance is established, sudden and extreme changes of temperature may be substituted in order to elicit the most pronounced effects of this valuable and highly tonic hydriatric procedure.

Relief of Stiffness.—This is best achieved by means of the *alternate* douche, which should be repeated as many times as desirable, and with temperatures graduated to suit the individual case.

The advantages of *douche massage* have already been considered in sections dealing with Aix and Vichy massage. Here we need only observe that in obstinate forms of fibrositis a hot massage douche, 104° F. and upwards, is one of the most valuable means we possess for effecting the absorption of fascial and intramuscular exudates.

In cases with no local tenderness, cold douches may be substituted, for, as Kellogg has pointed out, they are sometimes of great service in intractable lumbago.

In conclusion, the aggravation of pain that sometimes follows hydrotherapeutic procedures is more often than not due to *imperfect drying and subsequent chilling by evaporation.* Therefore, all precautions for preventing such untoward consequences should be scrupulously observed, and to this end also we should supplement any hot procedures by carefully graduated terminal tepid or cold applications.

Hyperæmia.

Local hot-air, vapour, and incandescent-light baths are all of considerable value in allaying pain and diminishing any swelling and stiffness that may remain after an attack of acute muscular fibrositis, as well as in the more chronic forms.

After such local applications, it is well to expose the parts to

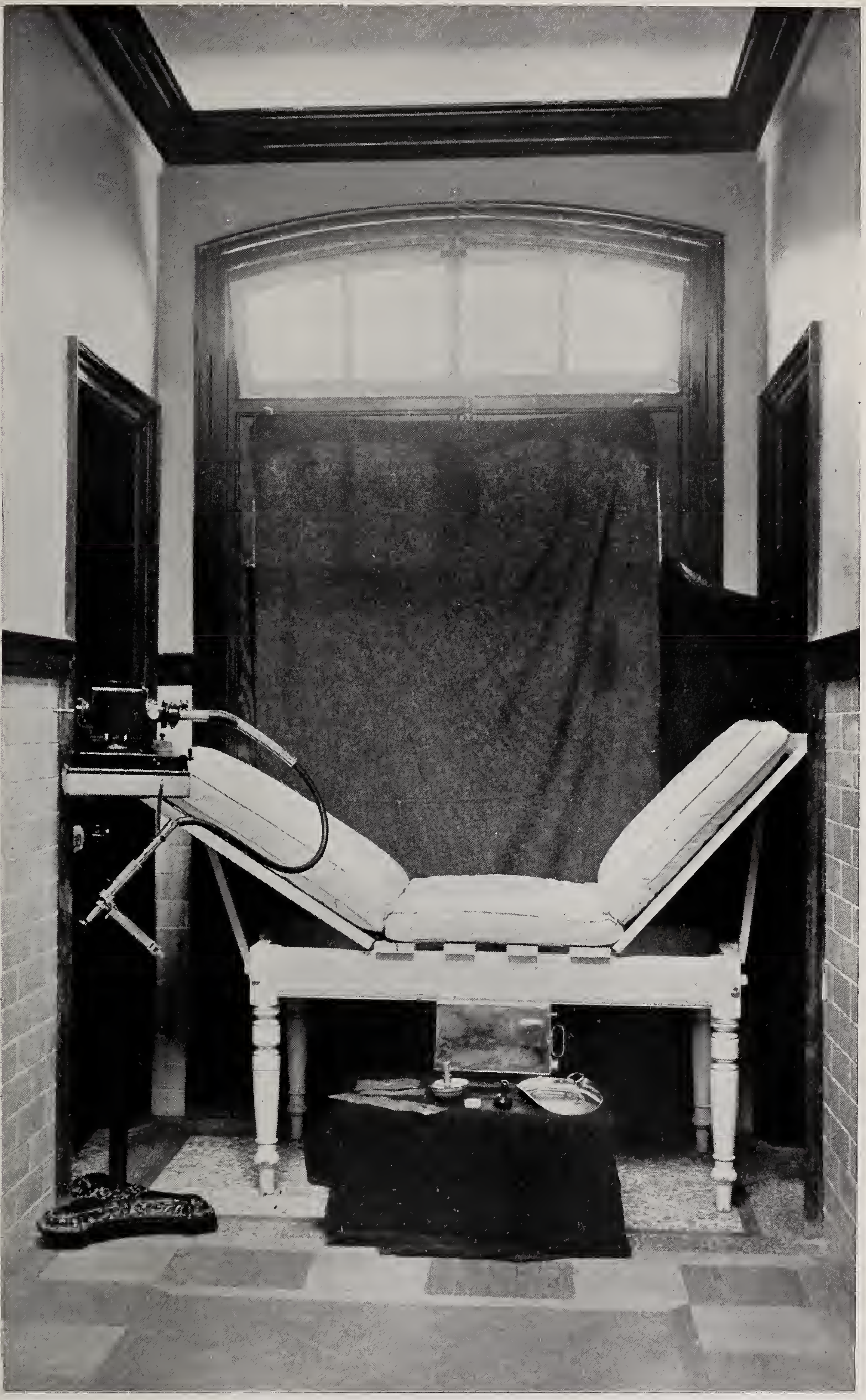


FIG. 99.—Apparatus for vibratory massage.

To face page 508.

an alternate spray or douche, and in obstinate cases the part may in the intervals be covered with a heating compress.

Such local exposures may be given twice a day, and either subsequently or on alternate days combined with massage and electrical treatment.

Localized applications of hot peat and mud often promote with surprising rapidity retrogressive metamorphosis of inflammatory deposits in muscle, fascia, and periosteum.

The technique and mode of application of all these procedures have been considered in detail when dealing with articular fibrositis, and all that need here be remarked is that they are highly useful as adjuvants to massage and hydrotherapy.

Electrotherapy.

Almost every variety of electrical treatment has at one time or another been invoked for the treatment of muscular fibrositis. Froriep, in his classical work, obtained excellent results from the electro-magnetic current, relying almost exclusively on this agent to effect the removal of indurations.

Of recent years, reliance has been placed on galvanism, faradism, ionization, and high-frequency methods.

For the relief of pain, *galvanism* applied to the affected muscles is often of value, especially if enlisted in the early stages.

Such anodal applications, if properly applied, are painless, and are of great use, for example, if applied to the nuchal muscles in *rheumatic cephalalgia.* The simple continuous current may be used, or ionization with salicylate of soda, and some speak highly of the analgesic effects of *high-frequency* and *static electricity.*

Where *stiffness and weakness* of the muscles is a prominent feature, rather than pain and tenderness, *faradism* applied daily to the affected muscles is of value.

Especially marked is the influence of the electrical current when applied in sequence to percussion or local Scotch douches.

Stockman recommends daily *faradism* of the affected muscles for some five to ten minutes, and the current of an intensity as great as can be tolerated. He regards it as an useful aid to massage, but not so efficacious, its beneficial results being more easily observed in panniculitic than more deep-seated deposits. Its primary influence is to increase the sensitiveness of the indurations, but finally their sensibility diminishes. Stockman inclines to believe that its analgesic effects are, like those of massage, due to dispersal of serous exudation, and subsequent shrinkage of the nodules.

Ionization with chloride of sodium or the iodides is, perhaps, more generally relied upon to effect absorption of exudates, and most advantageously in immediate sequence to hot fomentations, local hot-air or light baths.

Opinions differ very widely as to the actual degree of efficacy possessed by ionization in effecting sclerolysis, and, as it is so often combined with massage and other procedures, it is not easy to gauge accurately its precise value.

In conclusion, in regard of all these various electrical methods, it cannot for one moment be claimed that they are of equivalent efficacy to *massage*, to which agent, indeed, they must be regarded as subsidiary, and in no sense as substitutes.

Special Modes of Treatment.

Injection of Chromic Acid.—In the case of sharply-defined deposits, Stockman recommends the injection of 5 or 8 minims of a 1 per cent. solution of chromic acid in water. To be of any service, the needle must actually penetrate the substance of the nodule, and the marked pain that sometimes follows may be mitigated by the previous injection of hydrochloride of cocaine.

The needles should, of course, be sterilized, and if the nodule or infiltration be penetrated, relief occurs, which is often permanent; but though the deposit shrinks, it does not disappear wholly, and future pain and aching may call for repetition of the small operation.

Fibrolysin, too, has been advocated for this same purpose. The same technique should be observed, and the contents of one of the ampullæ now attainable is sufficient for one dose. It has been widely used in the treatment of Dupuytren's contraction of the palmar fascia, which some regard as a gouty or rheumatic fibrositis.

While good results have been recorded, it must be admitted that the high hopes entertained of its sclerolytic effect have been somewhat chastened, and certainly it cannot be solely relied upon, but should always be supplemented by massage and passive movements.

Excision of Nodules.

While in a few isolated instances excision has been performed for the relief of obstinate examples, it is obvious that the widespread and multiple nature of the deposits usually prohibits any attempt at their removal by surgical measures.

As before narrated, Strauss and other Continental surgeons have obtained good results by such a procedure, but in this country Stockman and Renton have furnished the only recorded cases.

These authorities consider that large and well-defined nodules alone lend themselves to surgical interference. When located in the subcutaneous tissues, the operation is more easy; but if their position is clearly defined, their excision from the perimysium presents no great difficulty. When, on the other hand, the fibrous formations are both small and deeply situated, they are correspondingly more troublesome, and before operation is embarked upon they should be subjected to thorough massage, under the influence of which they become harder and more defined.

Stockman considers that, given a well-defined nodule traversed by or impinging upon a contiguous nerve, and thereby giving rise to continuous pain and discomfort, its removal may be considered, provided all attempts at its dispersion by massage have failed.

The results obtained by operation in suitable cases, according to Stockman, are excellent, being marked by complete relief from all previous pain and discomfort.

CHAPTER XXXV

NEURO-FIBROSITIS

Local Therapy.

Clinically speaking, the dividing-line between neuralgia and neuritis is difficult of definition, and in the same way no hard-and-fast differentiation can be effected in the local therapy of the two conditions.

Such differences, indeed, as do obtain are governed more by the intensity rather than by the exact nature of the pathological change. Thus, for example, the local treatment of a severe and persistent neuralgia is in principle very similar to that adopted in a neuritis, if we except the measures undertaken to correct certain sequelæ peculiar to the latter, such as muscular atrophy and contractures.

This being so, we shall consider the two disorders, neuralgia and neuritis, simultaneously, while at the same time drawing attention to any modification dictated by either the etiology, the intensity of the affection, or the anatomical site of the nerve implicated.

In pursuance of this plan, we shall in the first place deal with the measures suitable for the acute types or stages, and subsequently with those appropriate for the subacute or chronic phases. Sciatica, by reason of its formidable character, first calls for consideration.

Sciatica.

Acute Stages.

If seen at their initial onset, severe types of sciatica frequently display some febrile movement, and there is little doubt that, given judicious treatment at this period, their evil potentialities can be largely obviated. When confronted, therefore, with an instance marked not only by severe pain, but also by a sense of local heat, and attended by pyrexia, we should in addition to general measures resort to local remedies to modify the vascular disturbance in the affected part.

Leeches—Dry Cupping.—As was first pointed out by that celebrated Neapolitan physician, Cotunnius, in 1770, nothing is more effectual for this purpose than leeching and dry cupping.

Leeches should be applied over the chief *tender points*, which may be in the buttock or back of the thigh, or dry cupping along the course of the nerve may be substituted, and in either case with often striking effects.

Some discrimination, however, must be used, for if pain be the sole symptom, and there be an absence of pyrexia and local heat, both these measures are contra-indicated.

In this event *counter-irritation* by mustard plasters or blisters may be used instead, especially in neuralgic cases; but where there is reason to suspect commencing inflammation, their application is best postponed to the stage of its subsidence, at which period they are invaluable.

By these measures, combined with a few days' rest in bed, an attack of sciatica may often be aborted; but if despite thereof the pain persists in intense form, immobilization of the limb is called for.

Rest and Fixation.

These may, without exaggeration, be held to be the cornerstones of successful treatment in the more severe forms of sciatica, and there is no doubt that the course of the disease would be appreciably shortened by their more timely adoption. For, as we have before insisted, most of these cases are the outcome of a *preceding lumbo-sacral or gluteal fibrositis*, and herein lies the urgent reason for early immobilization—viz., to prevent, if possible, direct extension of the morbid process to the nerve sheaths.

Similarly, in those cases where the nerve sheath appears to be primarily attacked, the same quietude is indicated in order to obviate pressure necessarily exerted by the gluteal or thigh muscles when actively contracted.

Immobilization, if it is to achieve its best effects, must be *absolute*. The limb should first be enveloped in cotton-wool, covered with oiled silk or some impermeable material to maintain equability of temperature, and lightly bandaged. If the case be only one of slight severity, this may suffice, and if not it may be supplemented by heated sandbags, and the dual advantage of restraint and dry heat may be thus enlisted.

If there be acute pain and tenderness, however, we have found it better to resort forthwith to Liston's long splint, which should be well padded, and extend from the axilla to the heel.

If possible, it should be furnished with a hinge at the knee, as Weir Mitchell recommended, as in this way the leg may be held slightly flexed, and the angle thereof altered at each renewal of dressings. The bandages and dressings should be reapplied twice daily from heel to groin, so as to lessen the amount of blood in the limb, while at the same time taking care to avoid direct compression of the inflamed nerve trunk.

The duration of immobility will, of course, vary according to the intensity of the attack, but its irksomeness will be very much relieved if the patient meanwhile be placed upon an air or water bed. To diminish the always imminent danger of a relapse, the subject should for a few days after the removal of the splint remain recumbent, neither rising nor sitting for some days.

Generally speaking, ten to fourteen days of this enforced quietude markedly mitigates the severity of the suffering, but it may be necessary to reapply the splint where its withdrawal has been too premature.

As a modification of the foregoing plan, Cramer advises that the limb be immobilized by plaster of Paris bandages, and fixed in a position of flexion, abduction, and external rotation.

A somewhat similar method was advocated many years ago by a Cheltenham physician, who achieved a great reputation for his successful treatment of sciatica, his custom being to envelop the limb from heel to groin with medicated strapping.

Fixation by Extension.—If a splint be objected to, the next best procedure is to apply weight extension after the method customary for fracture of the thigh. This is easily arranged by means of a stirrup attached to the lowest portion of the leg by strips of adhesive plaster, from which is suspended a weight of 7 or 8 pounds. To obtain the necessary counter-extension, the foot of the bed should, of course, be raised by means of a couple of bricks. The extension should be kept up continuously for some days, and with the decline of pain applied intermittently.

In conclusion, we would emphasize the importance of early resort to fixation in sciatica, and we would incidentally lay stress on the fact that these cases are usually preceded by a lumbar or gluteal fibrositis, thus allowing ample time for its enlistment as a prophylactic measure. Accordingly, we should not tarry until a definite sciatic neuralgia has developed, but, taking Time by the forelock, should counsel rest in any lumbar or gluteal fibrositis.

Thermic and Cold Applications.

Either of these may be employed concurrently with the immobilization, and their application provided for during the intervals at which splints and dressings are reapplied.

Hot applications are commonly the most soothing, and may take the form of fomentations or hot linseed-meal poultices applied along the course of the nerve. To be effectual, however, they should be renewed every ten or fifteen minutes for an hour twice or thrice daily. Or, what is more convenient, a series of hot rubber bottles partially filled, or heated sandbags may be utilized, and, where feasible, excellent results can be obtained from the local application of superheated air or radiant heat.

If it can be arranged without much disturbance to the patient, the old domestic plan of covering the buttock and thigh with brown paper, and passing a hot iron several times along the course of the nerve, is well worth a trial.

The local application of *cold* is sometimes grateful, both in sciatic neuralgia and neuritis, and in the former the ephemeral cooling of the skin by methyl or ethyl chloride not infrequently insures a rapid, if but temporary, mitigation of pain.

If atomization be employed, the spray should impinge narrowly along the track of the nerve from a distance of 6 to 8 inches.

The danger of causing scars and burns, especially by methyl chloride, should be borne in mind in *diabetic* or *cachectic* subjects.

At the onset of neuritis, too, freezing by means of icebags or by the local application of tampons of wool soaked in methyl chloride is sometimes palliative, but it is uncertain in its action, and is frequently unendurable.

The response of these cases to thermic or cold impressions is extraordinarily capricious, and the variation is unaccountable.

In some, relief may follow very hot, in others very cold, and in not a few alternate, applications of this nature. While, generally speaking, heat soothes, some cases appear to be aggravated by anything approaching a thermic reaction, which apparently excites the affected nerve. This intolerance may to a certain extent be met by the use of revulsive compresses, or the same end may be compassed by a very hot rubber bottle kept *in situ* for three or four minutes, and then instantly replaced by one containing cold water for twenty or thirty seconds.

Anodyne Applications.

In regard to these, we suffer from what may be truly described as *un embarras de richesse*, but the obstinacy of the affection and its unaccountable variability of response are such that it is always well to have another shot in one's therapeutic locker.

Most of the analgesic remedies found useful in the muscular and arthritic types of fibrositis are also useful for the relief of pain in sciatica.

The various sedative liniments, ointments, pigments, or plasters may be applied along the course of the affected nerve, and their soothing effect often enhanced by the simultaneous employment of hot compresses or dry heat.

The liniments of aconite, belladonna, chloroform, and opium are all useful, either singly or in various combinations, as well as those containing menthol, methyl salicylate, or other anodynes.

Strips of flannel or lint soaked in one or other of these preparations are placed along the track of the sciatic nerve, covered with oiled silk to prevent evaporation, and used in this way they frequently insure swift mitigation of the severity of the suffering.

Personally we can speak well of the combination of equal parts of the liniments of menthol and opium, and as an alternative the following preparation is serviceable:

℞	Menthol	2 drachms.
	Chloroformi	6 ,,
	Lin. camph. ammon.	4 ,,
	Lin. aconiti	4 ,,
	Lin. belladonnæ	1 ounce.
	Lin. saponis	3 ounces.

Misce; fiat linimentum.

Lortat-Jacob extols the following combinations:

℞	Menthol	15 grains.
	Tinct. opii	½ drachm.
	Chloroformi	5 drachms.
	Baume tranquille	1 ounce.

℞	Baume tranquille Baume de Fioraventi Methyl Salicylatis	partes æquales.

Sig.: To be applied on cotton-wool.

If the odour of the salicylate of methyl be objected to, it may be replaced by Ulmarene, an odourless substitute.

The *baume tranquille* (French Codex) is an oily extractive compounded of fresh hyoscyamus, belladonna, poppy, stramonium, etc., with a number of essential oils.

Of soothing ointments, the unguentum aconitinæ will generally procure relief if gently rubbed in twice daily until tingling ensues, or it may be painted on in the form of the oleate, care being taken to avoid broken skin.

The unguentum veratrinæ or the compound methyl salicylate ointment may be used after the same fashion, and Lortat-Jacob speaks well of the following pomade:

℞	Stovaine	15 grains.
	Ichthyol	75 ,,
	Adipis benzoatis	½ ounce.
	Vaselinum	to 1 ounce.

℞	Menthol	15 grains.
	Camphoræ	30 ,,
	Lanolini	5 drachms.
	Vaselinum	to 2 ounces.

Where there is exquisite tenderness, pigments which admit of application by means of a brush are more suitable.

The liniment or tincture of iodine, with or without guaiacol, may be painted over the nerve, but in severe cases it is necessary to enlist more definitely analgesic preparations.

Of these, anodyne colloid is one of the most reliable, as its action can from time to time be enhanced by applying moist spongiopiline over the collodion film.

As a substitute, the following is also useful as a pigment, the amyl hydride which it contains, by its rapid volatilization, insuring rapid relief:

℞ Menthol	1 drachm.
Chloral. hydrati	1 „
Amyl. hydridi	2 drachms.
Olei ricini	1 ounce.
Spiritus vini rect.	to 2 ounces.

Fiat pigmentum.

A scruple of hydrochlorate of cocaine may be added to the foregoing to enhance its analgesic action.

Lastly, in some of the milder instances the application of medicated plasters constitutes a convenient method of relieving pain. Those containing opium, belladonna, menthol, or salicylate of methyl are most in use for this purpose.

Oppenheim, it may be mentioned, attaches value to the emplastrum oxycroceum (Pharm. Belg.), which he thinks should not be discarded, and Williams's porous plaster is, he also holds, not to be despised.

Hypodermic Injections.—While, fortunately, as a rule the control of pain may be assured by one or other of the foregoing cutaneous applications in conjunction with rest, the need for subcutaneous injection of narcotics occasionally arises. Such is as a rule, however, uncalled for, save in cases where the pain is not only intense, but in a high degree *spontaneous*, and it need hardly be said that it should not be exhibited for the simple purpose of enabling the patient to pursue his avocation with less distress.

Morphia is the surest and most effectual drug to use, and it is preferably injected at the site of the greatest pain, when, if the sheath of the nerve be penetrated, the additional advantages of acupuncture will be secured.

The dose given should be the smallest compatible with the attainment of relief, and while ⅛ grain may suffice, it is rarely necessary to exceed ⅓ or ¼ grain.

The intervals between the injections should be as extended as possible, and unless pain is unendurable, they should not be repeated under twenty-four to forty-eight hours. Occasionally it happens that after one injection the distress never reaches the former degree of severity, and subsequently proves quite amenable to external applications. Frequently, even in more obstinate cases, repetition of the injection three or four times leads to complete and permanent cessation of pain.

If the case fails to respond save to constantly increasing doses, then morphia is best relinquished, and other drugs substituted, as the fear of habit formation is by no means imaginary.

Kept under the personal control of the physician, no ill results as a rule follow, but under no circumstances should the syringe be entrusted to the patient or his friends.

In instances marked by spasmodic twitching of the muscles or cramp, atropine may be substituted for, or combined with, the morphia.

Sir William Gowers held that cocaine was at least as successful as morphia, and much less objectionable, and recommended an initial dose of $\frac{1}{12}$ grain, to be increased rapidly to $\frac{1}{3}$ grain, and the injection given twice daily.

By the German physicians the following solutions, prepared according to Schleich's formulæ, are held in great esteem:

	Formula A.	*Formula B.*
℞ Cocaini hydrochl.	10 milligrammes.	10 centigrammes.
Morph. hydrochl.	5 ,,	0·02 centigramme.
Sodii chlor.	20 centigrammes.	20 centigrammes.
Aquæ destillatæ	100 c.c.	100 c.c.

In conclusion, one would advocate due reluctance in resorting to narcotics, as from an extensive experience of sciatica we feel sure that they are frequently resorted to unnecessarily, and before adequate and persevering trial has been made of other and less objectionable remedies.

Subacute Stages.

Under the influence of immobilization, aided by the measures just described, the pangs of acute sciatica rarely fail to abate; and although individual cases display variations, yet as a rule in from ten to fourteen days the amelioration is such that massage and passive movements can be embarked upon.

There is, however, no necessity for the splint to be relinquished, save during the actual process of friction and exercise. The sooner massage is begun the better, and we quite agree with Dr. Leonard Williams, that, "if employed early enough in all cases, few would become chronic."

Massage and Passive Movements.

It is advisable to begin with *gentle effleurage*, and all forcible manipulations should, of course, be strictly avoided, while the neighbourhood rather than the actual nerve itself should at first form the sphere of operation. This cautious method of approach does not in any way limit its usefulness, for in the majority of cases the disorder is of myogenic origin, and due to fibrositis located in the gluteus maximus and medius. Even though infiltrations may not at first be perceptible in the lumbo-sacral or gluteal regions, the effleurage should be persevered with, as with the increased tolerance that follows rubbing the nodules or infiltrations will rarely fail to be detected. For their more exact site in this neighbourhood, we would refer the reader to a previous section; but, nevertheless, while more commonly situated in this area, it must not be forgotten that nodules may develop anywhere in the muscles or fasciæ abutting on the course of the nerve. Consequently it is essential that effleurage and other manipulations, both for diagnostic and therapeutic purposes, should be carried out along the whole extent of the limb. Having previously dealt with the technique, we need here only remark that it should follow along the lines advocated for the acute stages of muscular fibrositis, and should be persevered with until all *infiltrations or nodules* are dissipated.

At the close of each séance of massage, it is essential that *passive movements* be instituted in order to obviate or stretch newly-formed adhesions between its superimposed muscles and the nerve sheath.

For their performance, the patient, previously lying prone on the couch, should turn on to his back, with his foot projecting a little distance beyond the end. The masseur, stooping down, now lays the heel of the affected limb upon his own shoulder, and should at the same time place his hands upon the patient's thigh above the knee, so as to arrest any flexion. He should then slowly essay flexion of the hip-joint with the knee extended. Naturally, at first the procedure is painful, and the expression of the patient's face must be our guide as to the range justifiable. When the extension has apparently reached the limit of the patient's power of endurance, the limb should be held there for a few seconds, and often then, by judicious encouragement, a still further extension may be tolerated, and so from day to day the amplitude of the movement increased. To evoke its best results, massage and passive movements must be carried out daily, and they should always include *exercise of the joints*, especially of the knee and ankle, to obviate the development of any contractures.

Electrical Methods.

Those most suitable to the subacute stage are galvanism, ionization, and diathermy, for—at any rate in cases of neuritis—it is inadvisable at this early period to invoke the stimulant effects of electricity, but rather its sedative, chemical, and thermal action.

Authorities, however, widely differ as to the most opportune period at which to enlist their aid. Gowers, who holds that most cases of sciatica are examples of *neuritis*, emphatically discountenances their use in any but the chronic stages. On the other hand, Oppenheim, who holds that the majority of sciaticas are of *neuralgic* nature, states that, "if diaphoretic methods have failed, we may at once, or after trying counter-irritation, resort to electricity."

Galvanism.—Personally we are accustomed to reserve its use for the subacute stages of neuritis, and the more spontaneous in character the pain, the more tentative should be our mode of approach.

We should, therefore, employ at first weak currents of 5 milliampères, these being gradually increased to 15 milliampères or more, as if stronger currents are invoked at first, pain may be aggravated.

The positive or anodal electrode should be placed upon the course of the affected nerve, either over its site of emergence or at a point tender to pressure. If there are several tender regions, more than one electrode may be attached to the positive pole, and in this way the several sensitive spots may be influenced.

In order to keep the positive electrode in intimate contact with the skin, it is advisable to fix it with bandages.

The negative pole meanwhile should be applied to some indifferent site, usually the lumbar region, and must be of ample size.

The skin being well dried, and the electrodes moistened with warm salt water, the current should be turned gradually on and off by means of a rheostat, and sudden interruptions guarded against.

Sometimes the small current of 5 milliampères does not soothe the pain, which, however, relents often as the current is slowly increased to 10 or 15 milliampères.

The duration of the séance must be graded to the sensitiveness of the patient, but commonly half an hour can be tolerated.

Ionization.—This is also of great value for its analgesic effects, and enjoys at present a very extensive vogue.

Large pads previously moistened with hot water are soaked, the negative in a saturated solution of salicylate of soda, and the positive in a solution of lithium carbonate. The former is placed over the loins or buttock, and the latter over the back of thigh. Large currents up to 100 milliampères should be used for half an hour. Iodine and cocaine ionizations have often been utilized for their analgesic effects. As an alternative procedure, but more suitable for later stages, the feet can be placed in a Schnee cell bath, and the affected limb connected with the positive pole.

This method of electrical treatment appears to be especially valuable in sciaticas of *gouty* origin, which constitute the majority, and is also useful in those following *influenza* or other infectious disorders. But it may be remarked that it is difficult in *syphilitic* cases to appraise its actual value, because of their conspicuous amenability to antisyphilitic drug treatment.

Diathermy.—The beneficial action of this variety of high frequency is largely attributable to its thermal effects. As regards its technique, pads of ample size, thoroughly well soaked, should be inserted between the electrodes and the skin. They should be fixed, one over the loin or buttock, and the other over the lower part of the thigh or calf. The current passed should be ½ ampère or more, and the séance should last half an hour.

The procedure is highly extolled by Dr. Lewis Jones in painful sciatic neuritis, more especially when the pain is spontaneous, or, in other words, is present even when the limb is at rest.

Counter-Irritation.

Though a painful and disagreeable procedure, there is, perhaps, no more certain means of procuring relief from persistent and nagging pain than *vesication*. Indeed, nothing speaks more eloquently for the truth of this statement than the frequency with which patients, when a relapse has ensued, request the reapplication of their blisters.

One, the size of a florin, should be applied over the point of emergence of the nerve, and usually under its influence the pain leaves this site, though it often reappears elsewhere. Our plan, therefore, is, as it were, to chase the pain from spot to spot by the application of small blisters along the course of the nerve.

As an alternative, we may in severe cases, especially of neuritis, apply collodium cantharides after a linear fashion along the nerve, or we may use a French preparation, *papier Fayard*, for the same purpose.

Where there is reason to suspect a *root* origin for the sciatica, a linear blister applied parallel to the spinal column over the level of exit of the affected nerves may be tried.

The blisters produced should be carefully dressed, as otherwise they give rise to considerable discomfort.

Also, great discretion should be used in *diabetic* subjects, and in any case they should not be applied to *anæsthetic areas*, lest troublesome ulceration follow.

In concluding our remarks on the treatment in subacute stages, we would emphasize the desirability of immobilization being maintained as long as pain persists during quiescence. We would insist, also, that the employment of massage, ionization, etc., be conducted tentatively, inasmuch as rough handling and unnecessary disturbance of the limb are but too likely to aggravate a condition which otherwise would be most happily influenced by their discreet employment.

Chronic Stages or Types.

In these, as in the former, the chief symptom that calls for relief is *pain*. This, of course, presents infinite grades in severity; but generally speaking it lacks the spontaneity characteristic of the acute stages of neuritis, and is more obviously called forth by traction or pressure upon the nerve.

The treatment of these chronic types, whether of neuritic or purely neuralgic nature, is often tedious and difficult; for, when the outcome of a previous neuritis, *adhesions* may have formed, or, in the case of a neuralgia, it may have a mechanical cause in the shape of a *nodule*, which perpetuates the painful paroxysm. The close dependence of the pain upon particular movements will be suggestive of adhesions, while palpation should enable us to detect the presence of myositic nodules impinging on the vicinity of the nerve trunk.

Procedures of the most diverse character are in use to obtain relief in these most obstinate cases; but, speaking for ourselves, we place chief reliance on massage, passive movements, and hydrotherapy to effect a cure. Concurrently, though, we believe, of subsidiary value, we may enlist the action of counter-irritants, electricity, and various forms of subcutaneous injections.

Massage and Passive Movements.

As before stated, these measures, if enlisted in the subacute stages and before organization of the inflammatory products has occurred, will cut short in a striking manner the disorder. But in these *chronic* forms adhesions are only too likely to have formed between the sheath and muscles, or these latter may be the seat of myositic nodules.

In the presence of these more profound anatomical changes, massage has, of course, to be correspondingly more vigorous, and weeks and months of steady and skilled rubbing may be necessary to effect the dispersion of a resistant and deep-seated nodule or infiltration.

But it is certainly astonishing how cases, even of very long standing, will eventually relent to massage and passive movements, even when all other methods have failed.

Hydrotherapy.

States of *acute* sciatic neuritis are unsuitable, and we have often seen instances where a premature resort to hydrotherapy has proved disastrous. Certainly it should not be invoked while the affected nerve is *the seat of pain, even when the patient is quiescent.*

In *subacute* and even *chronic* phases of neuritis, therefore, it is well to proceed cautiously, for fear of exciting an exacerbation, and we should, to begin with, avoid extremes of temperature and marked percussion effects.

Personally we invariably commence with an immersion bath of moderate or neutral temperature, combined with an *under-current douche* directed on to the track of the nerve. By this means the sensitiveness of the nerve is diminished, and if for any reason an immersion bath is contra-indicated, we can instead employ a neutral douche at low pressure as a preparation for more vigorous measures.

On the other hand, in instances of undoubted sciatic neuralgia we need be less chary of resorting forthwith to the more stimulating *alternating* or *Scotch douches*, and cases of recent origin often yield with remarkable swiftness.

But both in cases of sciatic neuralgia and neuritis, when we enlist these measures, it is, at any rate, safer to use them after a *graduated* fashion. Thus, in the Scotch douche we should begin with moderate temperatures and low pressure, increasing them gradually, as the local sensitiveness declines.

The hot application should be made by means of a fan douche, at a temperature of 115° to 120° F., or even higher, directed on to the track of the nerve with moderate pressure, and for a period of four to five minutes. It should be instantly followed by a cold jet, ranging from 80° to 50° F.; but, if tenderness be very marked, the jet should be a broken one, or we should use throughout a fan douche.

Where surface hyperæsthesia is very marked, we may, as Kellogg suggests, substitute a vapour douche, which has practically no percutient action, though it exerts a powerful thermic effect, and in sequence thereto a cold fan douche may be applied.

There is no doubt as to the extreme value of the Scotch douche, for, apart from its mechanical and stimulating effect, it directly promotes the absorption of exudates. In some instances it may be varied or replaced by alternating douches of hot and cold water of equal length, which are powerfully excitant, and, as Kellogg has pointed out, are of great service in cases in which the sheath of the nerve is inflamed.

In inveterate instances of sciatic neuralgia, the filiform douche is highly praised by Bernard; but it is a painful procedure, as, under the strong counter-irritation it produces, actual vesication may result.

Hot douching, in combination with massage, is also of the very greatest service, and Kellogg speaks highly of a cold massage douche in rebellious forms of sciatica in which the parts are not sensitive to pressure.

Hyperœmia.

Prolonged leg-packs, either in hot sand, peat, mud, or fango, though uncertain in their results, frequently are potently analgesic, and, indeed, in some cases appear to exert a curative action. In the same way, local hot-air or electric-light baths are often of great value, and form a fitting prelude either to alternate sprays or douches over the affected nerve, or to ionization or massage.

An extremely convenient method of producing such local hyperæmia is attained by exposure of the parts to the 500 candle-power light, applied as closely to the skin as the patient can tolerate.

Electrical Treatment.

These embrace hydro-electric baths, ionization, static and other forms of electricity.

In the hydro-electric bath we enlist, of course, the advantages of a warm or natural thermal water, as well as that of electricity, and under the influence of this combination the elimination of toxic matter is promoted, and in addition the nutrition of the affected nerve is stimulated.

This mode of treatment has been in use in Bath for many years, and is undoubtedly of value, unless it be resorted to at too early a stage of the disorder. Dr. Lewis Jones highly extols the general bath in combination with mild rhythmical sinusoidal currents.

Ionization.—Apart from analgesic effects, a sclerolytic action is sometimes enlisted to effect absorption of nodules or infiltrations. With this object in view, chlorine ions are employed; but, as far as our experience goes, it is but of limited value, and far inferior to massage.

According to Lewis Jones, in the later stages of sciatica ammonium chloride may be advantageously substituted for the sodium salt.

Static Electricity.—In inveterate cases of sciatic neuralgia, cutaneous irritation by means of the faradic brush sometimes proves successful in relieving pain. It has the advantage, moreover, that, unlike blisters or cauterizing agents, the skin remains undamaged, and thus its stimulant or counter-irritant effect can be renewed daily.

Either the brush discharge or the spark current may be employed. It may be applied over the site of emergence or over a tender spot, the current being increased up to the limit of the patient's endurance.

Grace has recently obtained excellent results in sciatica by a combination of local intensive irradiation followed by static electrical treatment.

He advises that, after localization of the tender points, they should be exposed for some twenty minutes to a 500 candle-power light till an obvious hyperæmia is produced. Subsequently, the patient being seated on an insulated platform, a metal electrode linked up by a wire to the positive side of the static machine is applied to the tender region. Meanwhile, the negative side is "grounded" with the spark-gap closed. The motor is then started and the spark-gap cautiously opened; but Grace is of opinion that the number of sparks traversing the space should not exceed 300, or preferably 200, a minute. The gap should be tentatively widened to the point of producing slight tenderness, and kept so for some five minutes, when it may be further extended, and so on. The séance should last for some twenty minutes, and is advantageously supplemented by a few static sparks applied to the gluteal and thigh muscles. The treatment should be applied daily at first, and subsequently at longer intervals. It is in sciatic neuralgia that the best results are obtainable from static electricity, but the method is unsuitable for acute stages of neuritis.

In chronic cases of neuritis, complicated by *muscular wasting*, the muscles supplied by the inflamed nerve do not as a rule call for direct electrical treatment. They usually recover under gentle rubbing, but their regeneration may be hastened by galvanism and mild faradism.

In severe cases, attended by *marked atrophic change*, it is highly essential that the parts be preserved from any *injury*, and this, as well as the equally necessary maintenance of due warmth, is best attained by enveloping the limb in cotton-wool. If decided paresis or palsy of muscles has ensued, *contracture* may follow. A cradle should, therefore, be inserted to prevent pressure on the part by the bedclothes, and the tendency to drop-foot counteracted by means of a sandbag maintaining the ankle in a position of dorsi-flexion.

Subcutaneous Injections.

In one form or another these have long been resorted to for the relief of pain, both in sciatic neuralgia as well as neuritis. While, generally speaking, their use has been reserved for chronic sciatica, there is now a tendency to resort to them in cases of recent origin, and especially in those of neuralgic nature.

Alcohol, chloroform, ether, osmic acid, carbolic acid, methylene blue, salicylate and glycerophosphate of soda have all at one time or another found advocates. But although a beneficial effect was recorded in many instances, still, the unpleasant fact remained that a destructive effect sometimes followed their injection actually into the nerve sheath.

Thus, by different observers either immediate paralysis or neuritis has been noted to follow the introduction of carbolic acid, osmic acid, ether, chloroform, and strong solutions of alcohol.

But it is only fair to add that osmic acid is still highly extolled, among others by Sir William Whitla. Like Oppenheim, he believes that subcutaneous injection of this substance is probably of dubious value, but he has known intractable cases yield after its injection into the nerve substance. He employs 5 to 15 minims of a 1 per cent. solution, half to one-third of which he injects at two or three spots along the course of the nerve.

The subcutaneous injection of methylene blue, as advocated by Ehrlich, has the drawback of being followed by the formation of nodules, which require time for absorption, and so, if this agent be invoked for its analgesic properties, oral administration is always preferable.

But of recent years all these substances have to a large extent been forsaken in favour of the *deep or intraneural injection of normal saline solution.* The method is associated with the names of Schlosser and Lange, and the latter is accustomed to inject 3 to 4 ounces of a solution of eucaine (1 in 1,000 of normal saline).

As a variant to this method, Wilfrid Harris first injects the nerve with 2 c.c. of a 2 per cent. solution of eucaine, instantly afterwards introducing 100 c.c. of 0·9 per cent. saline. By this means the pain that follows the introduction of the saline is obviated.

Strumpel-Müller and Krause advocate the following mixture:

Stovaine	0·1-0·2.
Suprarenin hydrochlor. (sol. 1: 1,000) ..	gutt. x-xx.
Aq. dest.	ad 100.

Solut. steril. per ½ h.

Stovaine, like eucaine and novocaine, has the drawback of producing vaso-dilatation, to counteract which it is customary to combine it with cocaine or adrenalin.

Apart from the foregoing combinations of local narcotics with normal saline solution, the latter may be used by itself.

In essaying this method of injecting the nerve sheath, it is highly desirable that the skin should be thoroughly disinfected.

The penetration of the nerve is by no means always easy, a point greatly in favour of Whitla's plan of multiple as opposed to a single injection. To localize the probable site of the nerve certain points of reference are taken. If it be desired to penetrate the sciatic nerve at the point of emergence, one of the following methods may be adopted: The subject lying on his side, with his leg and thigh semiflexed, a line is drawn from the trochanter to the sacro-coccygeal joint, and the needle is thrust in on this line two fingers' breadth from the ischial tuberosity (Brissaud, Sicard, and Tanon). Levy and A. Baudouin localize it in the following manner: Taking a line from the sacro-coccygeal joint to the postero-external extremity of the great trochanter, they plunge the needle in one thumb's breadth external to the junction of its inner and outer two-thirds.

A simpler and more general plan is to thrust the needle vertically in at a point 3½ to 4 inches horizontally outwards from the top of the intergluteal fold, this representing the site of the sciatic notch. But if the tenderness be experienced lower down, the nerve may be pierced as it passes between the trochanter and ischial tuberosity.

The depth at which the nerve lies varies greatly, and a needle of 8 to 10 centimetres should be used and inserted perpendicularly. After the skin is pierced, a few drops should be gently ejected after Schleich's method of producing infiltration anæsthesia. The needle should then be pressed onwards until the subject winces and feels painful sensations in the leg and foot, which will indicate that the nerve has been reached. The remaining contents of the syringe are then passed into the nerve.

Anton Bum is very insistent on the necessity of using large quantities of fluid (100 c.c.), delivered under as high a pressure as possible. In cases most favourably influenced by this treatment, immediate cessation of pain follows the injection, and tender areas coincidently lose their sensitiveness to pressure. Some hours afterwards the patient may complain of a sensation of swelling or tension in the limb, but this usually passes off after a few hours. Recurrence of pain within three or four days is not unusual, and necessitates a repetition, or even a series of such.

After this slight operation the patient should rest in bed for thirty-six to forty-eight hours, especially if massive injections have been used.

Hay of Glasgow has obtained good results with small amounts (20 c.c.) of physiological salt solution without eucaine, and if such limited quantities be used recumbency is unnecessary.

Also, where large amounts of fluid are introduced, a transient rise of temperature may occur. Unfortunately, however, this method of treatment, though records are most favourable, has been followed in a few instances by a peroneal paralysis.

Though it was used by Lange, apparently with success, in some acute cases, it appears more suitable for those of *subacute* and *chronic* type.

Anton Bum, indeed, would taboo its use in acute cases, and prefers to enlist it in types free from pain except on movement—in other words, those whose symptoms are suggestive of *perineural adhesions*.

In conclusion, it must be admitted that while a large percentage of cases have been reported as cured, failures and recurrences have also occurred.

At the Royal Mineral Water Hospital, Bath, too, the results obtained have been uncertain, and, as far as our experience goes, this method of perineural infiltration is of little or no value in sciatic *neuritis*.

As regards sciatic *neuralgia*, too, it is never safe to predict a lasting cure, for though immediate benefit often accrues, recurrence is not uncommon, and this variability in the response of cases constitutes the chief drawback to this otherwise valuable method of treatment.

How its curative effects are produced is uncertain; but, judging from the class of case benefited—*i.e.*, those due to *adhesions*—it would seem probable that its action is purely *mechanical*, and due to stretching of the adventitious bands that drag upon the nerve trunk.

Subarachnoid and Epidural Injections.

The employment of these in chronic sciatica is largely due to French physicians, who are accustomed to make use of such intraspinal injections in those cases of sciatica in which the distribution of sensory troubles is indicative of a *radicular* origin.

Though good results have been obtained by the *subarachnoid* route in a certain number of sciaticas, the unpleasant after-effects and dangers connected with it have led to its replacement largely by *epidural* injections.

Method of Technique.—The patient lies on his left side, with the legs drawn up so that the sacrum is prominent and the sacro-coccygeal ligament is rendered tense. Two small bony prominences, which form a triangle with the last sacral segment lying above them, delimit the space filled by this membrane. A needle is then plunged perpendicularly through the sacro-coccygeal ligament. This resistant plane having been pierced, the needle is pushed upwards into the spinal canal to a distance of 3 to 4 centimetres. This minor operation should, of course, be carried out with strict antisepsis, and the injections made slowly and gradually. If properly performed, the fluid should pass into the epidural space of the sacral canal, spreading upwards thence along the roots as they pass out into the foramina.

Solutions of cocaine, stovaine, antipyrine, and also artificial serum have been used. In the case of cocaine, 1, 2, or 3 c.c. of a 1 per cent. solution are introduced, and in the case of stovaine slightly larger doses. Simple artificial serum (10 to 20 c.c.) has also been used, and the good results which follow have been attributed to their mechanical effect in stretching the fibrous tissue, which in some cases is believed to encompass the roots.

According to Lortat-Jacob, slight tingling or numbness in the lower limb either follows immediately or some hours after, but no other adverse symptoms occur.

The sciatic pain sometimes disappears, but in any case usually diminishes, though it is apt to return after a certain time, but in a lesser degree.

In recent cases of radicular sciatica a cure usually follows a series of *epidural* injections, but in those of ancient standing amelioration only can be hoped for. Syphilis being so commonly responsible for radicular sciatica, it seems likely that the injection of salvarsanized serum into the cerebro-spinal fluid would give better results.

Unfortunately, the method is of no avail in cases of *compression sciatica,* and the authors add that it is likewise useless in *hysterical* types of sciatic pain.

Retrorectal Injections.

Jaboulay, according to Lortat-Jacob, pursues the novel plan of injecting either air or physiological serum into the retrorectal tissues, with the idea of stretching the sympathetic nerve fibres proceeding through the sciatic nerve. Cordier of Lyon has also reported well of this procedure, and Massolongo and Danio have noted good results to follow injection of oxygen at the point of maximum intensity of pain.

Additional Methods of relieving Pain.

Cauterization.—In rebellious cases of neuralgia the actual cautery, originally introduced by Paulus Ægineta, and subsequently employed by Cotunnius in this disorder, may be tried. One or more superficial *points de feu* should be made over the tender spots by a Paquelin's thermo-cautery, or it may be lightly drawn in linear fashion over one or more branches along which the pain may be referred.

This has largely replaced the old button cautery, first introduced by Day, which, after plunging in boiling water or heating in a spirit-lamp, was lightly applied to tender points or drawn along branches the seat of persistent pain.

Digital Compression.—In olden days firm and continued pressure by means of a ligature or a tourniquet was occasionally practised to relieve pain when excruciatingly severe.

Recently Negro has revived this method in a modified form. He advocates pressure being applied to the sciatic nerve at the level of its exit for several seconds, this being remitted for an interval of some minutes. As a general rule, according to him, complete relief of pain follows a series of six séances of this description; and Arullani has devised an apparatus by which the compression can be effected.

X Rays and Radium Emanations.—Good results have been claimed for both these special methods of treatment. Relief has followed the exposure of the sciatic trunk area to the X rays, and, according to Babinski, cure has resulted when all other methods have proved futile. As regards the reputed efficacy of radium in the treatment of neuralgia, time is not yet ripe for any definite conclusions to be drawn.

Surgical Treatment.

In all forms of compression sciatica the possibility of surgical intervention naturally obtrudes itself.

Apart from this group, however, certain rebellious types of sciatica sometimes yield to surgical procedures. The cases especially suitable for such intervention are those the result of a *perineuritis*, or traumatic examples in which the nerve trunk is either adherent to or embedded in cicatricial tissue.

Clinically *the existence of adhesions may be suspected when the pain, though absent during rest, is persistently evoked by all or some particular movement.* The procedures adopted are acupuncture, bloodless stretchings or neurolysis, and various open operations.

Acupuncture.—In this operation a series of needles are plunged deeply and at right angles into the nerve sheath, and left *in situ* for twenty to thirty minutes This method has been largely abandoned, but recently Midelton has reported excellent results, if the needle punctures are immediately painted with the following solution, which he uses as a continuous counter-irritant:

℞	Olei crotonis	1 ounce.
	Cantharidini	3 grains.
	Acidi acetici fort.	1 drachm.
	Olei amygd. dulc.	to 8 ounces.

The advantages of simple acupuncture are, of course, enlisted in all the hypodermic or intraneural injections previously described.

Bloodless Nerve-Stretching.—This consists in forcible flexion of the hip beyond a right angle, the knee being then gradually extended until the leg is in a straight line with the thigh. For its successful performance, of course, a general anæsthetic is necessary; but Lazarus advises that the limb be previously made insensitive by lumbar anæsthesia, and Alexander, to this same end, advocates Schleich's method of infiltration anæsthesia.

Results obtained by bloodless stretching have been conflicting. While successful in some cases, even of long standing, in others recurrence has ensued. Its range of value would appear to be limited to cases in which the adhesions are of slight extent or are of recent formation. In rare instances spontaneous cure has sometimes resulted when, through some sudden movement, rupture of adhesions has taken place.

Open Operation.—In this procedure incision is made over the sciatic nerve. Afterwards the finger or a blunt hook is inserted behind the trunk, which is then steadily pulled upon until it is thoroughly dislodged from its bed; or, as an alternative, multiple lineal incisions are made into the sheath of the nerve, by which means large veins and any adhesions which may be present are severed. Subsequently, the limb is placed in a long splint, and after immobilization has been maintained for some days passive movements are instituted.

A. Pers is accustomed to slit the nerve sheath and needle the trunk, believing that, by thus diverting the flow of obstructed lymph, pressure at the seat of obstruction will be relieved.

Exposure of the nerve trunk, with subsequent division of adhesions, is very strongly advocated by Crawford Renton in states of perineuritis. His series comprises thirty-two cases, all characterized by absence of pain during rest, but in whom it ensued invariably on walking.

The technique consisted of the usual vertical incision, followed by division with scissors of any adhesions that were present. The results obtained by Renton were very striking, all of the cases operated on having remained well, one for a period of thirteen years, and it is noteworthy that such good results were obtained in cases where the condition had endured for three, four, and even seven years.

A more radical operation is advocated by Bardenhauer, who exposes the sciatic nerve roots by a partial resection of the sacrum or sacro-iliac synchrondrosis. This observer believes that the symptoms are due to compression of the nerve roots as they emerge through the bony foramina, and accordingly, to obviate this, he subsequently embeds the nerves in the muscles.

He claims that the operation is most successful, and suggests for it the designation *neurinsarcoclesis*.

In cases of *varicose sciatica* Lortat-Jacob states that ablation of the varicose vessels is attended by good results in the majority of instances.

Neurotomy, or excision of a portion of the trunk, has also been practised, but has been abandoned owing to the *paralysis* that inevitably results.

In conclusion, it need hardly be said that, before advising at any rate the more severe surgical procedures, the greatest care should be taken to exclude all *intra- and extra-pelvic causes of sciatic pain*. Clearly, also, they are not to be recommended, save in instances where the symptoms are very suggestive of the presence of adhesions, and only then in the event of failure having attended less heroic methods of treatment.

Local Prophylactic Measures.

These are of some importance, as for a considerable period relapses are not unlikely to ensue. Local exposure to draughts or damp are particularly pernicious. In addition the subject should avoid sitting on hard, sharp-edged chairs, save with the intervention of an ample cushion, or even one containing air. Sudden movements should be carefully avoided, especially in the direction of overextension, and the lifting of heavy weights should, wherever possible, be refrained from.

Crural Neuralgia and Neuritis.

The principles of local therapy for these allied conditions are precisely similar to those laid down for sciatica.

In acute forms or stages rest is the sheet-anchor of treatment, supplemented by thermal and anodyne applications, with, as auxiliaries, ionization and diathermy.

In the subacute and chronic stages massage, passive movements, and hydrotherapy are the most reliable weapons at our disposal, while for the relief of pain in obstinate cases we have a choice of remedies—counter-irritation, saline injections, and so on, with, as a last resort, surgical intervention.

Brachialgia.

The local therapy of this affection, like that of its analogue, sciatica, is often a most tedious process. Comparably to the latter disorder, brachial neuralgia or neuritis is not infrequently associated with, or arises in sequence to, a condition of brachial fibrositis.

In the acute stages our efforts are directed towards the removal or control of the local condition and the mitigation of pain, while in the chronic stages, if neuritis be present, we have in addition to combat failure in nutrition and the development of deformity.

Acute Stages.

In instances of sudden onset, commonly referable to cold or exposure, the very severity of the suffering may suggest the propriety of leeches or dry cupping, especially if there be signs of local congestion, as shown by redness of the skin or a sensation of throbbing.

It is in the incipient stages of a neuritis that such local measures are called for, and if undertaken sufficiently early they sometimes cut short a threatened attack. But too commonly, however, these cases do not come under observation until the morbid process is well established, when the following procedure is more suitable.

Rest.—This is an indispensable auxiliary to all other forms of treatment, and though, at any rate in brachial neuralgia, movements do not necessarily or invariably increase pain, fixation of the limb is no less desirable. It is of course all the more necessary if there is the slightest suspicion of neuritis, for, as Gowers on this point remarks, " the difference between a little movement and none during the acute stage of the affection is enough to make a considerable difference in the effect on the inflammation of the nerves."

If seen at the onset of the acute stage, and especially if, as sometimes happens, there be slight fever, the patient should keep to his bed. Meanwhile the limb, after being snugly enveloped in cotton-wool, should be thoroughly supported by a pillow.

Otherwise a sling must be requisitioned, or, better still, the arm bandaged to the side of the chest to obviate movement. Stiffness of the joints may follow the enforced immobility, but this risk may be mitigated if, with the decline of the acute stage, a timely resort be made to massage and passive movements.

The evil consequences of not fixing the limb are even more certain, as almost inevitably the morbid process is aggravated and prolonged, as we have known it, for nine to twelve months.

External Applications.—If the local signs of congestion are very marked, the application of an icebag may prove more soothing than heat, but generally speaking continuous warmth is more grateful.

In incipient neuritis, therefore, fomentations should be applied every two or three hours, the parts in the intervals being covered by a moist compress overlaid by mackintosh. Or the limb may be steamed or exposed to a local hot-air or radiant-heat bath.

In other cases, more particularly of neuralgic type, revulsive compresses, renewed every two or three hours, seem to procure more comfort, but care should be taken that the parts in the intervals are well covered with cotton-wool and some impermeable material.

The effect of these thermal applications may be reinforced by various sedative and analgesic remedies. All those previously mentioned as suitable for the acute stages of sciatica, such as aconite, belladonna, chloroform, menthol, etc., are eligible, and usually by means of one or the other the pain is rendered endurable.

Frequently in pure brachialgias the pain is diffused over the whole limb, and in this case an ample casing of antiphlogistine may be applied at intervals.

Where a definite *neuritis* exists, pain is more localized to the nerve trunks, and direct application of some sedative pigment, such as anodyne colloid, may give great relief.

As an alternative we may enlist mild galvanism or ionization, the positive electrode being placed over the site of pain or tender spot, and currents of 5 to 15 milliampères passed through the nerve trunk.

The intense suffering in brachialgia sometimes refuses to relent to the foregoing measures, and in this event it may be necessary to resort to morphia or cocaine, while to the safeguards that should be observed we have already alluded in sciatica.

Recently, Wilfrid Harris has drawn attention to the fact that in certain cases the radiating pains of brachialgia can be swiftly cured by the injection of a few drops of strong alcohol. The tender points should be accurately localized, and after sterilization and freezing with ethyl chloride he injects 2 or 3 drops of a 2 per cent. solution of eucaine, and afterwards 5 to 10 minims of 90 per cent. alcohol. The sensitive areas are usually in the scapular region, and before injection is performed care should be taken that the limb has not been moved since their localization. The needle should penetrate down to the bone of the scapula or rib, and as it is withdrawn 2 or 3 drops of the alcohol should be injected along the track. The immediate result is an exacerbation of pain lasting for some hours, but by the next day local soreness is all that remains, the neuralgic pains having disappeared.

Subacute and Chronic.

The relief of pain may still be the chief consideration, and at this stage *counter-irritation* by means of flying blisters or the actual cautery often are of the very greatest value.

In purely neuralgic cases the faradic brush is a convenient and very effectual method of applying cutaneous irritation.

As soon as pain during repose has ceased and tenderness to pressure has disappeared, gentle *massage* may be invoked with advantage once or twice daily. If no aggravation ensues, it may be shortly reinforced by tentatively performed *passive movements.*

If, as often happens, areas of infiltration or nodules are detectable, the rubbing must be persevered with until such have wholly disappeared, as otherwise recurrence is but a matter of time.

The séances of massage may with advantage be preceded by a local light bath, or the wished-for hyperæmia may be procured by a hot-air bath or local packs of peat or mud.

Muscular atrophy, if extreme, may be met by weak, slowly interrupted galvanic stimulation, but as a rule the wasting is of a moderate degree, and the muscles usually recover under the influence of gentle rubbing with resistance exercises.

Where convenient, too, the advantages of local hydrotherapy should always be secured, as often it proves invaluable in relieving the pain of an obstinate brachialgia or raising the nutrition and tone of the parts when impaired by a previous neuritis.

It need hardly be said that care should be taken to avoid too strong percussion effects when tenderness is present, and, as we pointed out in sciatica, our hydriatric treatment should in all examples of this nature be carefully graduated to each case.

Except in cases of *secondary* origin, cervical rib and so forth, surgical intervention is rarely called for. But in inveterate cases of brachialgia Oppenheim states that nerve-stretching may be permissible, a procedure described and advocated by Nageli.

TRAUMATIC FIBROSITIS

CHAPTER XXXVI

TRAUMATIC FIBROSITIS

In consonance with the view expressed in our introduction, we shall devote this section to a consideration of those types of " chronic rheumatism " or fibrositis which are clearly attributable to the action of trauma.

The clinical content of this group is sufficiently imposing, for it includes—

1. Subacute rheumatic synovitis.
2. Certain forms of bursitis still affiliated to " chronic rheumatism," but which are probably the outcome of injury.
3. All types of muscular fibrositis due to trauma, including traumatic lumbago.

Subacute Rheumatic Synovitis.

Etiology.

In this disorder the synovial membrane is the seat of a subacute or chronic inflammatory process, which by subsequent extension may involve the tendon sheaths and bursæ, and sometimes the periosteum and fibrous investments of the bones.

By the older authors it was said occasionally to follow or develop out of an attack of *acute articular rheumatism ;* but while there may be a previous history of such, there is little or no evidence of any direct continuity.

Apart from this, the assumption as to its " rheumatic " nature was probably largely attributable to the ancient fallacy that, whenever a joint disorder arose in sequence to exposure to *cold or damp,* it must perforce be a " rheumatic " manifestation.

The usual history of the affection, moreover, tended to foster the idea, for it is astonishing how often the condition is traceable to some slight traumatism associated with or followed by a thorough wetting or " chill."

Hence its frequency in outdoor labourers, or those of the leisured classes who indulge in fishing, hunting, golf, or some such pastime.

The tendency to overlook or minimize the traumatic element in its production was doubtless favoured by the fact that the injury sustained by the joint is usually not of direct, but *indirect* origin, and withal is apparently trivial in degree.

To our mind the *traumatic* origin of the disorder is distinctly suggested by the following features:

1. Its *monarticular* distribution.

2. Its predilection for joints especially liable to injury—*i.e.*, the *knee* and the *shoulder*.

3. The history in the knee either of a sprain or excessive walking or standing, and in the shoulder that of a jar through a fall on the hand or elbow, and sometimes, as Mr. Robert Jones pointed out, in sequence to Colles' fracture of the radius.

While admitting that the element of trauma looms large in the genesis of this type of synovitis, it must be recollected that it frequently occurs in those who present *gouty* stigmata or have suffered from " rheumatic " manifestations.

But though we believe that injury is an ample and sufficient cause, yet we are convinced that a coincident gouty or " rheumatic " diathesis does occasionally cast its impress on the character of the local process, chiefly in the direction of a special impetus to chronicity.

Morbid Anatomy.

The character of the morbid change will vary according as to whether *effusion or thickening* of the synovial membrane is the predominant feature.

In the former instance, beyond excess of fluid, no alteration —even in cases of some standing—may be detectable in the synovial membrane. The mere mechanical effects, however, of persistent or recurring distension are sufficiently serious in that they lead to laxity of capsule and ligaments, and ultimate articular disorganization.

More commonly there is not much effusion, but thickening is the salient feature, and the marked tendency of the inflammatory products to undergo transformation into fibrous tissue was held by older authors to be especially characteristic of " rheumatic " synovitis.

The synovial membrane undergoes thickening, which in the case of the knee is usually more marked on each side of the ligamentum patellæ, while in long-standing cases the subcrureal sac may be converted into a dense hard cushion.

In inveterate forms the morbid process extends to the subsynovial and ligamentous tissues, with resultant sclerosis of capsule, ligament, and synovial membrane.

Wasting of the muscles, in the shoulder the deltoid, and in the knee the extensors, shortly ensues, and involvement of the bursæ may be a conspicuous feature.

Long-standing examples in their terminal stages may show secondary articular lesions suggestive of osteo-arthritis, and, having regard to the great frequency with which localized types of the latter find their starting-point in injury, this gradation into the more serious disorder seems not improbable.

Fortunately such untoward instances are rare; but it is well to realize that, if neglected or improperly treated at its onset, total disorganization of the affected articulation may ensue.

Clinical Account.

Mode of Onset.—According to the severity of the mishap, the onset of symptoms referred to the joint may be immediate or more or less remote. In the latter instance, a period of weeks may elapse before any discomfort is experienced, the slight casualty being either forgotten or held to be quite unconnected with the condition for which advice is sought.

Robert Jones, discussing this subacute type of synovitis as it affects the *shoulder*, strongly upholds its *traumatic* origin, and claims that it is typical of the affection that no symptoms are referred to the joint till three weeks after the injury.

But Sir William Bennett—animadverting on the incidence of *effusion without heat* in joints after sprain—holds that if its appearance is postponed for a fortnight or more the possibility of contributory factors in the shape of *gout*, *rheumatism*, etc., must not be overlooked.

The results of treatment strongly support the latter contention, but, at the same time, to place the two views in opposition would to our mind be irrational. For they appear quite compatible, having regard to the proverbial frequency with which injury, especially in gouty persons, determines the site of arthritic manifestations.

Leaving this vexed question aside, we pass now to the clinical account of the symptoms as they affect the shoulder and the knee.

Shoulder-Joint.

Here, as in the knee, the affection is a slow, persistent process, the presence of which, especially if the history of trauma be vague or remote, may be disregarded or misinterpreted.

The first symptom to attract attention is stiffness, especially marked on rising from bed, or during the performance of certain movements—placing the hand behind the head, etc.

The degree of pain experienced by these patients is variable, and in mild cases is not spontaneous, but requires to be evoked by movement.

Unless there be much effusion, inspection does not reveal appreciable alteration in the appearance of the joint. If it be present, the humero-pectoral groove at its upper end becomes indistinct or obliterated. On palpation, tenderness is found to be present *below and to the outer side of the coracoid process.* Its presence is deemed by Mr. Robert Jones to be pathognomonic of the affection, and he further states that its disappearance and replacement by tenderness over the insertion of the deltoid is a reliable sign of approaching recovery.

On passively moving the joint, limitation of its range in all directions is found, especially *abduction* and *external rotation.* This is attributable to the high degree of scapulo-humeral spasm that prevails, and unless the examination be carefully conducted the rotation of the scapula may mask the very real limitation of movement at the shoulder-joint.

If adequate rest be not forthcoming, and exercise be persisted in, the pain of course becomes aggravated, motion more restricted, and swelling more pronounced. Ultimately the deltoid and scapular muscles undergo wasting, and *adhesions* of greater or less extent form within the joint, and a condition of fibrous ankylosis results.

As we shall see later, it is probable that in some of these cases tearing or strain of the thinner anterior portion of the shoulder capsule may be the *fons et origo mali;* and Thomas, in the *American Journal of Medical Sciences* for 1911, would distinguish this variety in that the tenderness is situate in the *axilla,* and not, as in subacute rheumatic synovitis, beneath the coracoid process (*vide* Subacromial Bursitis: Differential Diagnosis).

Knee-Joint.

The features presented may be either those of *subacute* or *chronic synovitis with effusion,* or, what is more typical, there may be little or no fluid, but the membrane undergoes gradual thickening.

In the former instance, while the patient complains of stiffness, he is often able to use the joint fairly freely. But if effusion is of any degree, full flexion of the leg may be painful owing to stretching of the synovial membrane, and so he keeps it slightly bent.

If the bursæ and adjoining sheaths are also involved, these become puffy, and add to the discomfort and disablement.

With rest and other suitable measures the fluid usually undergoes absorption; but the slight degree of pain which is experienced becomes a source of danger, in that the subjects are apt to get about too quickly, and so a recurrence of effusion or a series of such relapses take place. The attendant muscular wasting of the extensors giving rise to marked laxity of the knee capsule, this factor of course still further favours the tendency to passive distension. Ultimately the condition may form one of the varieties of *hydrops articuli*, and a flail-like joint ensues, usually with abnormal lateral mobility.

In the more common type, characterized by gradual *thickening of the synovial membrane*, stiffness and pain rather than swelling are the marked features. In the initial attack, as well as in the first few exacerbations, there may be moderate effusion. But the distinctive feature is that each attack leaves behind additional thickening of the synovial and perisynovial tissues.

On the subjective side the patient is bothered by stiffness in the performance of certain movements, especially in the morning.

This, though it passes away after exercise, is invariably worse on the day after considerable exertion has been taken, and especially if he be gouty. Errors in diet and changes in the weather seem also to aggravate the pain and stiffness.

To add to his uneasiness, it begins to worry him at night, and he finds it difficult to assume a restful pose, his discomfort being aggravated frequently by cramp of the related muscles.

On inspection, the affected joint in advanced cases shows enlargement, but the swelling lacks the rounded contour typical of intrasynovial effusion, and is more angular in character.

On palpation, tenderness to pressure is not marked, but the membrane gives the impression of increased density, though as a rule no sense of fluctuation is perceptible.

The synovial secretion, indeed, may appear deficient rather than excessive, and movement after long quietude evokes a creaking noise, in some instances of very coarse type.

When the bursæ are involved they become thickened and resistant, and the tendon sheaths distorted by knotty enlargements. *Pari passu*, the range of movement becomes correspondingly restricted, and further limitation may ensue through the formation of peri- or intra-synovial bands.

Diagnosis.

The chief sources of fallacy that beset the diagnosis of this affection are its confusion with other joint lesions of traumatic origin and monarticular diseases of infective nature.

It will be convenient first to consider the salient features and differential diagnosis of the disorder as met with in the *shoulder*, and subsequently to discuss these points in relation to the *knee*.

Subacute Synovitis of Shoulder.

Etiology.—A history of injury, which is *usually indirect*, is forthcoming—a fall on the hand or elbow, with often coincident exposure to cold and wet.

Onset.—The condition may develop out of an acute attack, but more often it arises insidiously some weeks after the alleged trauma.

Symptoms.—Increasing pain and stiffness in moving the shoulder-joint are complained of, and the severity of the pain varies with the intensity of the morbid process.

Local Signs.—Tenderness *below and to the outer side of the coracoid process* is present. The swelling varies with the degree of effusion, being often slight and with difficulty appreciable. If massive, the fulness is most noticeable near the anterior margin of the deltoid, and fluctuation is sometimes detectable in the axilla. The arm is slightly abducted and inwardly rotated.

Spasm of scapulo-humeral muscles, often of high grade, is present, and movement thereby is restricted *in all directions*.

Course of Disease.—The morbid process shows a tendency to resolution, with gradual decline of the associated muscular spasm, while the tenderness initially felt beneath the coracoid migrates during convalescence down to insertion of the deltoid.

Complications.—These are represented by marked atrophy of the scapulo-humeral muscles, the formation of intra-articular adhesions with limitation of movement in one or more directions, and aggravation of the morbid process by gouty or rheumatic proclivities.

Differential Diagnosis.

Periarticular Adhesions.

Etiology.—There is a history of *direct* injury to shoulder, with residual pain and limitation of movement. Sometimes it is a sequel of dislocation or fracture of the neck of the humerus.

Symptoms.—Pain is felt during *certain movements*—such as buttoning braces, shrugging shoulders, raising hand to head, etc.—and occurs at the moment when motion is checked by the restraining band. If movement is persisted in, the pain increases until the former posture is restored, when it ceases. The pain is of a stabbing, sickening character, but *always distinctly localized.* It is often worse at night, as with muscular relaxation during sleep dragging on adhesions ensues. The pain is absent save when traction is exerted on the bands.

Local Signs.—Tenderness is localized to *site of adhesion—e.g.*, the front of the shoulder when there are adhesions between the long head of biceps and its sheath. The limitation of movement is often masked by rotation of the scapula. If the scapula be fixed and the joint be moved passively, its mobility, though restricted, is—*within the limit imposed by the adhesions*—perfectly free and smooth. This retention of movement in all directions—though limited in range along certain lines—is typical of *extra-articular* adhesions.

In protracted cases marked atrophy of the deltoid and scapular muscles is present.

Osteo-Arthritis of Shoulder.

Etiology.—The commencement of the affection often dates from an accident—a fall on the shoulder or a strain.

Onset.—This is gradual and insidious.

Symptoms.—Pain is referred to the joint or to the outer aspect of the arm. It is of persistent aching nature, but often radiates down the limb. Increasing weakness and stiffness, especially after rest or sleep, are complained of, while there is creaking or crackling on movement.

Local Signs.—In the initial stages great effusion is sometimes present. In the terminal stages the shoulder muscles waste, and the bony processes around the joint are conspicuous. The head of the humerus is enlarged, and often displaced upwards and forwards. Crepitus on passive movement may be felt over the joint, while there is marked limitation of mobility, especially in the direction of abduction and elevation.

Skiagraphy shows the presence of marginal exostoses.

Tuberculous Disease of Shoulder.

Etiology.—The affection is more often met with in children and young adults. A history or presence of tubercle elsewhere is often forthcoming.

Onset is very insidious and gradual.

Symptoms.—Pain is absent or slight, and there is increasing stiffness and limitation of movement.

Local Signs.—If primarily *osseous*, there is present enlargement of the head of the humerus. If primarily *synovial*, thickening of the membrane is to be met with. Rapid and marked wasting of the scapular muscles takes place. Abscess formation is common.

Constitutional Symptoms. — These comprise wasting and pyrexia. A positive tuberculin reaction is forthcoming.

Subacute Synovitis of Knee.

Diagnosis.

Etiology.—A history of excessive standing or walking, or strain, with exposure to wet and cold, is usually forthcoming.

Onset.—It may arise out of an acute attack, but more often is insidious in its development.

Symptoms.—Pain and stiffness, aggravated by over-exercise, weather changes, and dietetic indiscretions, are complained of.

Local Signs.—These may be those of (*a*) synovial effusion, or (*b*) synovial thickening.

(*a*) Uniform distension of synovial sac is present, while fluctuation in all axes of the joint is to be obtained. The patella rides on the front of the swelling, and can be concussed against the femur. If effusion be massive, flexion of the knee ensues.

(*b*) The joint is enlarged, but not distended, its contour is less round and more angular. There is no fluctuation over the joint as a whole, while the patella tap is absent and the synovial membrane feels dense and elastic.

Occasional coarse creaking on movement can be obtained, and flexion of knee from thickening and retraction of flexor tendons may be present.

Course and Complications.—In cases *marked by effusion* there is a great tendency to relapse or recurrence, with extensor wasting, and ultimately laxity of ligaments ensues, with consequent undue lateral mobility.

In cases *marked by thickening* there exists a tendency to progressive restriction of the range of movement of the knee.

Differential Diagnosis.

Where the joint is the seat of a *chronic or oft-recurring effusion*, the chief sources of fallacy are—Definite traumatic lesions of external or internal origin, hæmophilic arthritis, intermittent hydrarthrosis, and passive effusions of infective or neurotrophic nature.

Traumatic Lesions.

Displaced Semilunar Cartilage.—The internal is most often affected.

Onset.—This takes place suddenly after a wrench or fall.

Symptoms.—Intense pain, with inability to fully extend knee, is complained of, and the joint is locked in the position of flexion. There is tenderness over inner tibial tuberosity at point of

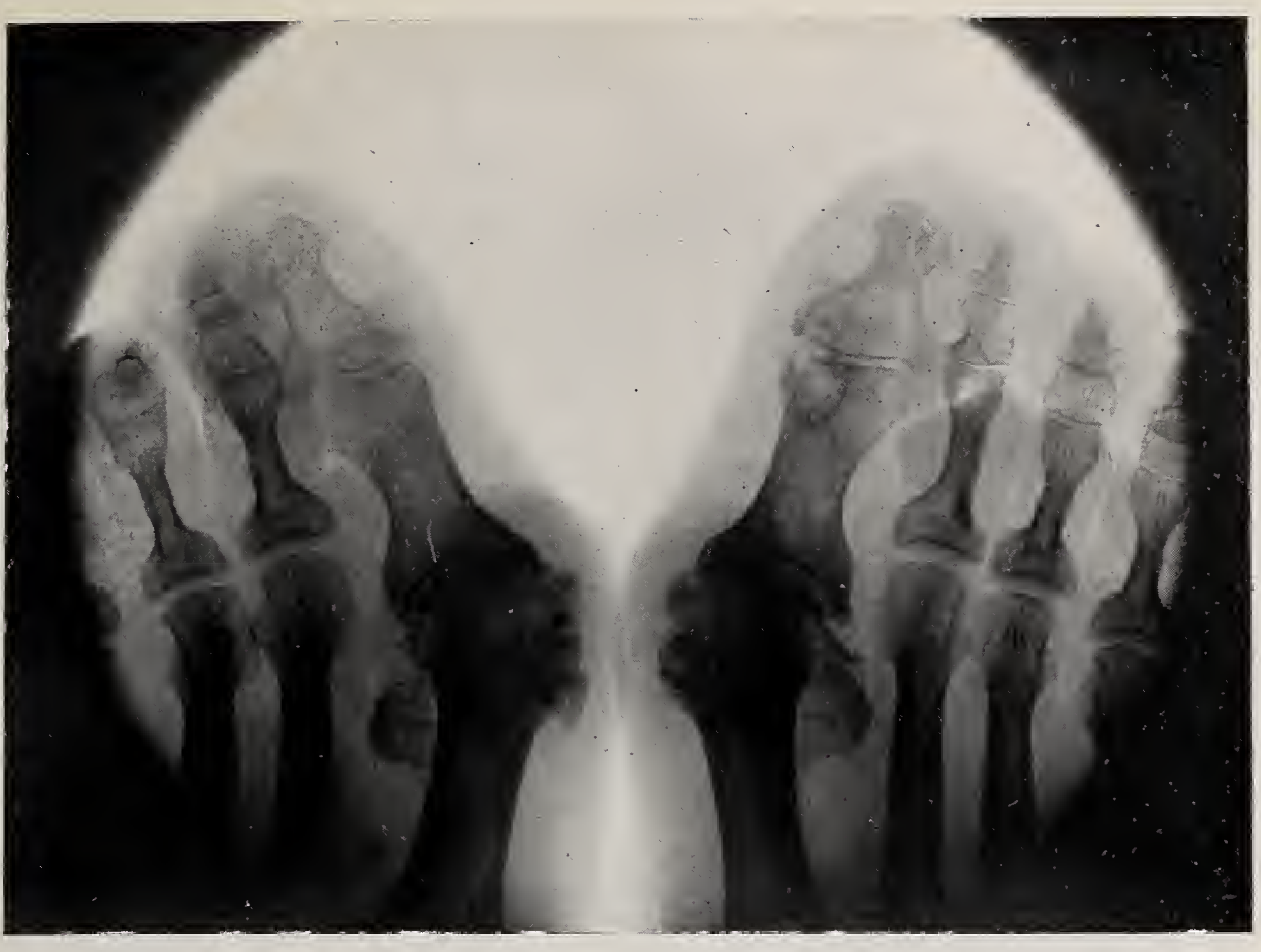


FIG. 100.—Skiagram of double hallux valgus. Note outward displacement of great toes.

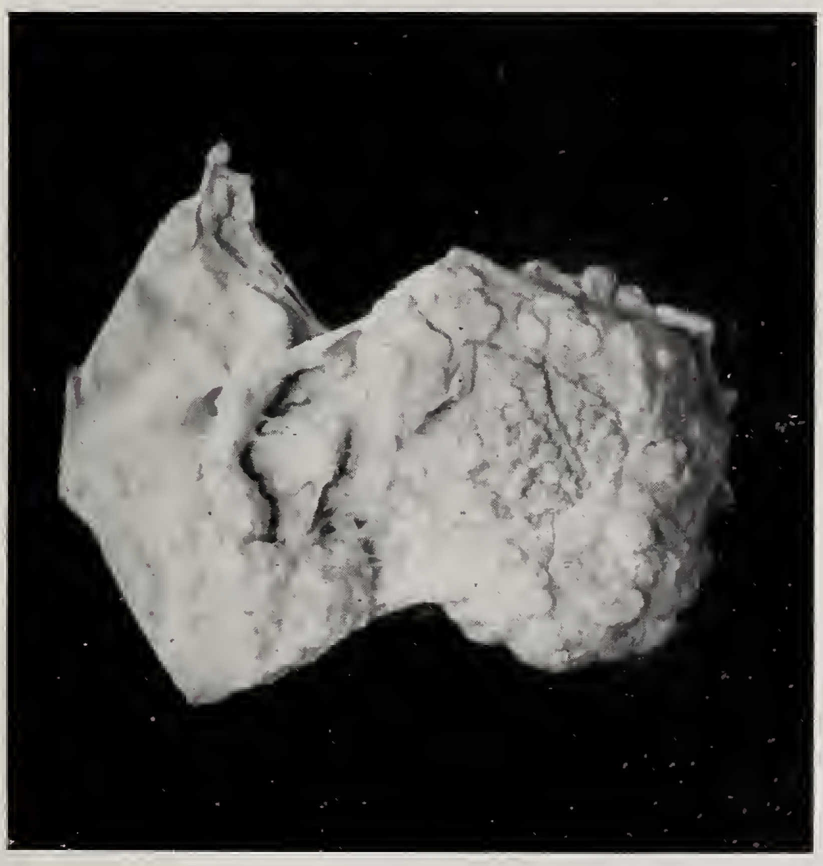


FIG. 101.—Loose body, nearly four centimetres long, removed from a knee-joint, and composed of coarse fibrous tissue in which a few groups of fat cells were discernible microscopically. (U. C. H. Museum.)

attachment of internal lateral ligament. Immediate synovial effusion follows with a marked tendency to recurrence.

Loose Bodies—Symptoms.—These are similar to those met with in the former affection, but less severe—viz., recurring locking and effusion.

The diagnosis is based on the *detection of movable bodies.*

Nipped Fringes.—The *Symptoms* comprise attacks of pain followed by effusion, and occasional pseudo-locking; tenderness at site of nipped fringe; local or general joint enlargement; crackling on flexion and extension of joint; enlarged villi appreciable by palpation. Both knees are often involved.

Lipoma Arborescens—Symptoms.—Pain may be present, but is never acute, and locking seldom occurs. There is no tenderness on pressure. *Swelling of joint is to be met with, but there is little or no effusion present.* There is an enlargement usually to one side of the patellar tendon.

All the foregoing traumatic lesions frequently pass muster as examples of "rheumatic" synovitis, an error very liable to occur if the history be not carefully inquired into. Even the existence of a displaced cartilage may be masked by the synovial effusion which follows the injury, and the condition classed as one of "rheumatism" or "simple traumatic" synovitis.

For while the initial accident is severe, a recurrence of the trouble is frequently determined by trivial causes, and if the condition only comes under notice at this period it is easy to overlook its primary *traumatic* origin.

The exact differentiation of the various lesions, loose bodies, enlarged villi, etc., is admittedly difficult, and often impossible without exploration. But even if we fall short of this refinement in diagnosis, careful investigation of the history and a thorough physical examination will certainly enable us to establish the all-important point in the case—its *non-rheumatic* nature.

Skiagraphy should, of course, not be omitted, as incidentally it may disclose the presence—especially in villous arthritis—of marginal exostoses, indications possibly of an incipient osteo-arthritis.

Other joint conditions that may be confused are *hæmophilic* arthritis, and, where the effusion is massive, hydrarthrosis of *infective* origin as well as *Charcot's disease* of the knee-joint; but for the differentiation of these disorders we would refer the reader to past and coming sections.

On the other hand, when the joint is the seat of *chronic synovitis with thickening*, the conditions that may be confused are syphilitic and tuberculous synovial disease, inflammatory processes, and neoplasms in the articular ends of the bones.

Perisynovial and Peribursal Gummata.

Middle-aged subjects, especially women, are mostly affected.

Symptoms.—Pain is slight, and mobility but little impaired. Joint enlargement is nodular and uneven. Tertiary ulcers or scars in the neighbourhood of the knee are to be met with. The diagnosis rests on the history of infection, the presence of other lesions, the response to specific treatment, and Wassermann's test.

Primary Synovial Tuberculosis.

The subjects of this affection are children or young adults.

Symptoms comprise stiffness and intermittent limping of the affected limb, general elastic swelling of the knee with signs of inflammation, some restriction of movement with flexion of the joint, marked atrophy of thigh muscles.

A positive reaction to tuberculin and successful guinea-pig inoculation will serve to clinch the diagnosis.

Disease of Bone.

Chronic Osteitis.—The subjects of this affection have usually suffered from syphilis. The pain is situate in the bone rather than in the joint. It is of an aching, gnawing character, with nocturnal exacerbations.

The bone is tender to pressure and often increased in bulk.

New Growths.—These are usually periosteal or central sarcomata, and their distinctive features are a soft swelling, comparatively painless in early stages, which grows rapidly and steadily, and if centrally situated expands the bone with eggshell crackling, and is sometimes pulsatile.

Treatment.

The principles to be adopted are essentially the same as in the more acute forms of periarthritis, the end and aim of our treatment being to restore the joint to its former functional efficiency.

In these *monarticular* types of so-called "rheumatic" synovitis, those who uphold their purely traumatic origin regard the administration of antirheumatic drugs as futile. Still, at their onset these cases may be distinctly acute, with slight pyrexia, which may be met by purgation followed by a diaphoretic mixture.

The action of salicylates is very variable, but if there be a history of acute rheumatism or other rheumatic manifestations they should be given a trial in full doses.

In instances lacking such indications, and in whom the *traumatic* factor is clearly obvious, better results will follow

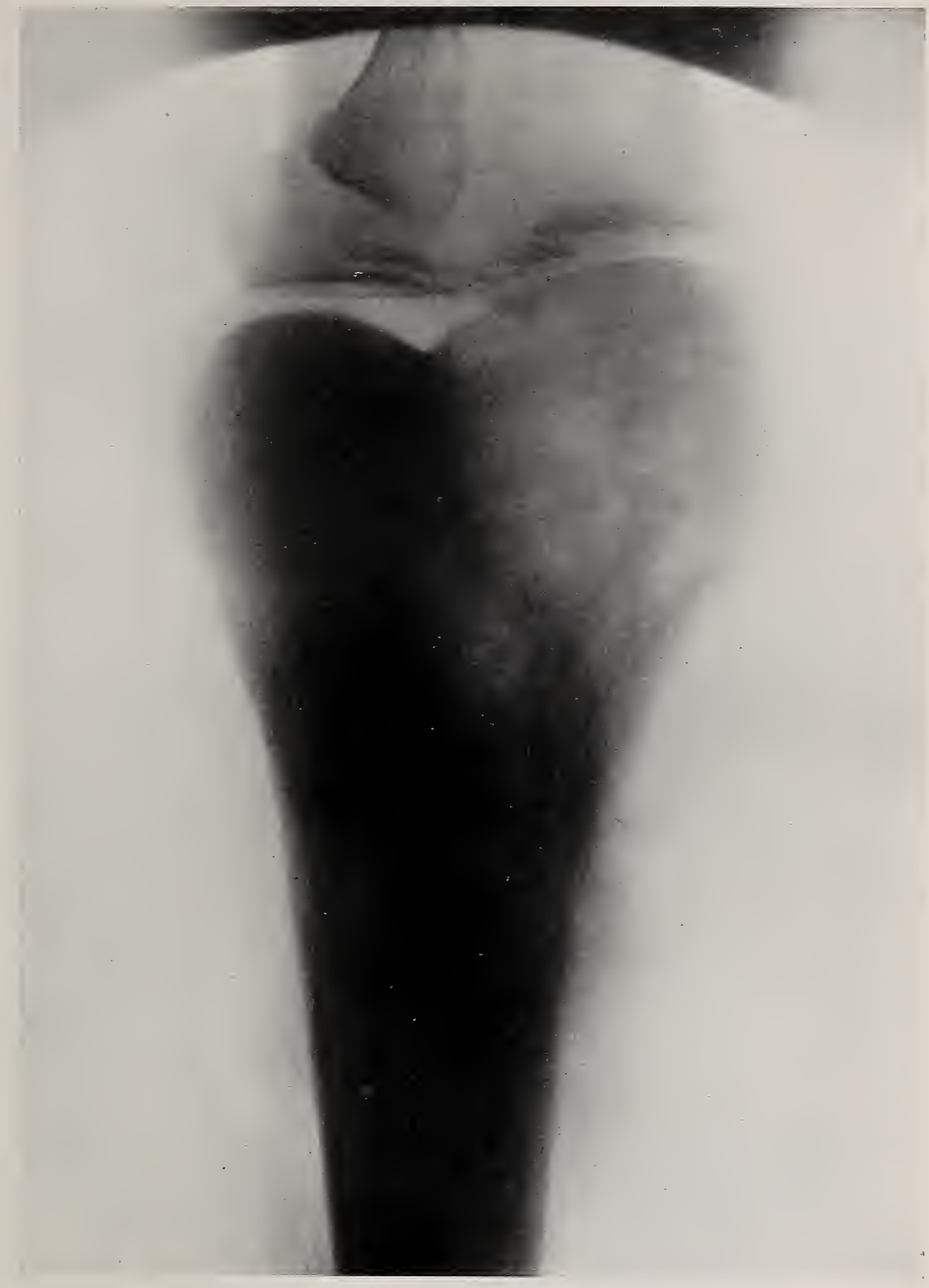


Fig. 102.—Skiagram of sarcoma of femur.

To face page 548.

saline purgation coupled with a few doses of James's or antimony powder.

If there be any history of *gout,* alkalies and colchicum with aperients should be exhibited, and in the more severe instances the severity of the pain may necessitate resort to nightly doses of Dover's powder or hypodermic injections of morphia.

But before proceeding farther, we would emphasize the fact that we should depend on rest, fixation, and local measures, rather than drug treatment.

Local Measures.

If seen during the acute phases the prime indication is *rest* and *fixation.*

In the case of the *shoulder* this is best attained by a suitably-applied sling, and if the *knee* be the joint affected, the limb should be placed on a back splint with the joint slightly bent, and the extremity raised on a pillow.

Relief of Pain.—For this purpose, in the more acute types hot or cold applications may be utilized. If cold is invoked, the most effectual plan in the case of the knee is to suspend an ice-bag from a cradle just touching the joint surface, otherwise the weight is apt to prove irksome. The packing with ice, if it prove soothing, should be continued until the severity of the inflammation subsides.

If the pain, instead of being assuaged, is aggravated by the cold application, it should be replaced by poultices or fomentations, and if heat and tension be pronounced, these may be preceded by the application of leeches.

Where the pain is obstinate, a useful plan is to pack the joint with a warm alkaline and opium lotion, the saturated lint being covered with oiled silk and cotton-wool, or we may paint the surface with green extract of belladonna or glycerine of atropine covered with fomentations.

More cleanly and equally soothing are hot compresses of carbolic acid (1 in 40), or a saturated solution of boracic acid.

Treatment of Effusion.—So pronounced in these "rheumatic" cases is the tendency to *thickening* that aspiration is rarely called for. But where persistent or excessive effusion is present, its removal with antiseptic precautions is imperative.

Very often its presence constitutes the sole obstacle to swift recovery, and neglect of its timely evacuation not seldom bequeaths a legacy of permanent weakness and unreliability. The fluid being withdrawn, pressure by a bandage firmly applied over cotton-wool is essential.

Duration of Fixation.—The acute symptoms having more or less disappeared, the all-important question to decide is whether absolute rest should or should not be persisted in.

By premature movement we run the risk of relighting the inflammatory process, while the continuance of absolute rest after the decline of the acute phase has subsided is equally prejudicial. For, apart from the menace of *intra-articular adhesions*, we have to reckon with the residual stiffness of the muscles that invariably ensues.

The *cessation of pain*, the *disappearance of heat, swelling, and muscular spasm* are the events which point to the subsidence of the morbid process. The period of time during which absolute immobility may be necessary will, of course, vary according to the severity of the case, but generally speaking two to three months are required. Rest must be continued as long as pain and muscular spasm ensue on attempts at passive movement, and their recurrence is always an indication for further quietude.

Massage and Passive Movements.—Even in such cases, however, there is no objection to gentle derivative massage of those parts of the limb segment which lie proximal to the joint, and the movements should of course be exerted centripetally.

Such massage is more easily carried out in the case of the *knee*, as it is a *sine quà non* that the actual joint should not be subjected to any movement either direct or indirect.

In cases with effusion it is advisable, if no contra-indications are present, to begin passive movements before its complete absorption has ensued. In the same way, when fluid has been removed by aspiration, massage should be enlisted, first without and subsequently with passive movements.

As soon as possible voluntary motion should be undertaken, and in the absence of adhesions the power of movement is soon regained, but one should always be careful that the exercises are carried out throughout the whole arc of normal movement.

In the *shoulder* manipulation during the painful stage, while spasm of the scapulo-humeral muscles is present, may do much harm, and when a relapse or exacerbation has been in this way provoked, a return to rest with the arm somewhat abducted and externally rotated is essential.

But here, again, as in the knee-joint—though less easily applied without movement of the joint—massage and kneading of the shoulder muscles should be practised once daily; indeed, rubbing and shampooing may often be employed some time before any motion is bearable.

If tenderness to pressure of any degree be present over the shoulder-joint, the essayal of passive movements should be postponed pending its disappearance. But the locality of such sensitiveness often shifts—as the disease clears up—to the neighbourhood of the deltoid insertion, and migration to this spot may be taken as an indication that passive movements are permissible.

But too commonly in these cases the recovery of normal mobility is very tardily compassed, and this is not infrequently referable to premature attempts at passive movement.

On the other hand, when the period at which passive exercises have been embarked upon has been well chosen, recovery of voluntary movement is usually fairly rapid.

In cases of long standing with *great thickening of the synovial membrane*, our efforts will be chiefly directed towards relieving pain, promoting absorption, and combating stiffness.

It is in these cases, marked by thickening rather than serous effusion, that *counter-irritation* by blisters and the galvano-cautery proves so very successful.

For the dissipation of exudates and thickening we should enlist the aid of alternate douches, local hot-air or electric-light baths in combination with massage, and active and passive movements.

The success which will attend such measures will largely depend on the measure of attention paid to details of technique, and having already dealt with the application of these various procedures in detail, their recapitulation is uncalled for.

There is, however, one troublesome complication that has to be considered—viz., the formation of adhesions of peri-articular or intra-articular site. For the differentiation of peri- and intra-articular adhesions we would refer the reader to the previous sections dealing with the treatment of these sequelæ as they occur in the undifferentiated infective arthritides.

Treatment of Adhesions.

These may be ruptured by sudden or forcible means, or we may adopt some other method of gradually overcoming the resistance they offer to movement of the joint.

Forcible Rupture.—If, after observing the safeguards previously laid down, we elect to follow this course, we may profitably precede the operation by a course of massage and passive movements in sequence to hot-air baths and douches.

Such procedures may do a great deal to relax muscular spasm, and the time so engaged is well spent, as the atrophy of the muscles, otherwise likely to occur, will be considerably minimized.

In regard of the operation, opinions differ as to whether or not an anæsthetic should be invoked. Some consider it essential, others deem it unnecessary, but, for ourselves, we have tried both methods, and must admit an inclination to perform it without an anæsthetic when the patient can be prevailed upon to consent.

Those instances with a fair range of mobility, and in which the check to further motion takes place abruptly and particularly in one direction, are the most suitable for sudden rupture.

Technique.—To perform this minor operation satisfactorily, it should be recollected that it is not so much a matter of overcoming as eluding muscular resistance. Thus, suppose, in the case of the knee, the limitation be in the direction of extension or flexion, the operator, in order to absorb the patient's attention, makes a great show of rotating the leg, and then, when all conscious efforts of the patient are directed towards counteracting this movement, flexion or extension of the knee is suddenly sprung upon him, the antagonistic muscles being, so to speak, taken completely off their guard.

The objection, of course, to this method is the acute pain and the muscular resistance which may be encountered, but when successfully performed the pain soon ceases if the parts are vigorously " slapped " and rubbed.

If an anæsthetic be enlisted there is no need for any surprise attack, and the joint should be moved firmly and slowly throughout its complete range of movement.

After-Treatment.—After breaking down the adhesions the joint should not be fixed, as otherwise it will rapidly become stiff. We have seen this untoward result supervene within the first twenty-four hours.

Friction and hot douches, as well as passive movements of the joint throughout the full extent of normal range, must without fail be carried out. Moreover, voluntary action should be encouraged, and any tendency to shirk any particular movement should be immediately corrected, as such patients are often apt to restrict their endeavours to those movements which do not occasion suffering.

If for any reason sudden or forcible rupture is contraindicated or is objected to by the patient, then, of course, we will have to content ourselves with suitable exercises arranged with the aid of weights and pulleys or one of Zander's appliances.

This method is, of course, a very long-drawn-out process, but it may be cut somewhat shorter if supplemented by assiduous massage combined with hot douches, local vapour, hot-air, or electric-light baths.

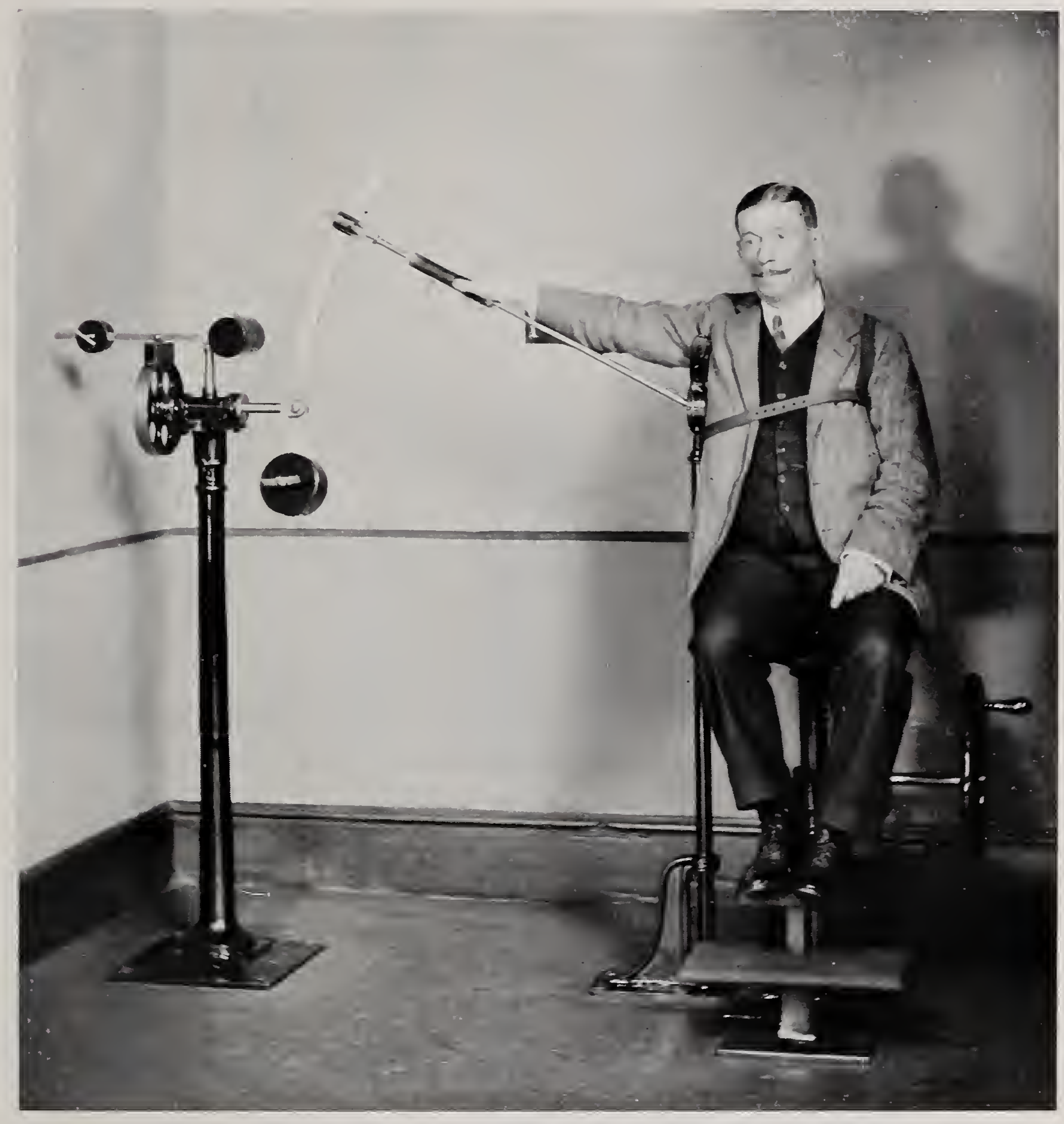


Fig. 103.—Zander's appliance for movement of shoulder.

(By kind permission of the Bath Corporation.)

To face page 552.

CHAPTER XXXVII

"RHEUMATIC" BURSITIS—BURSAL AFFECTIONS OF UPPER LIMB—BURSAL AFFECTIONS OF LOWER LIMB

"Rheumatic" Bursitis.

By the older physicians the bursæ mucosæ were regarded as especially prone to undergo inflammatory changes of gouty or "rheumatic" nature. Thus, the illustrious Sydenham observed that enlargement of the bursæ was common in *gout*, and later Scudamore commented on the suddenness and rapidity with which they became distended, tender, and ultimately thickened in persons of this diathesis. While their claim in regard of gout was abundantly justified, it is less easy to comprehend the even greater stress laid by them on "rheumatism" as a causal factor.

But how deeply convinced they were of its etiological potency is attested by their nomenclature, which clearly shows that they held it to be a special manifestation; hence their usage of the now obsolete term "bursal rheumatism."

No bursa was believed by them to be immune, though Fuller in his writings remarks that the wrist, if not a site of predilection, was one of the most common situations for such enlargements.

From this time on, however, the importance of *trauma* as a cause of acute and chronic bursitis was more and more realized, and gradually the numerical content of the old term "bursal rheumatism" so shrank that nowadays one scarcely ever hears the word "rheumatism" invoked save in connection with the subdeltoid bursa.

As to why the subdeltoid more than any other bursa—for example, the subgluteal—should be singled out as especially prone to "rheumatic" processes is hardly clear, as the latter by reason of its anatomical site is at least equally exposed to such exciting causes as cold, damp, etc.

We fear, indeed, that this furnishes but another proof of the somewhat flippant and illogical manner in which the term "rheumatic" is applied to any painful disorder whose etiology for the nonce may seem obscure.

But to resume: the process of etiological differentiation did not cease with the assignation of trauma as a frequent and efficient cause, for swiftly it transpired that many forms of bursitis, previously regarded as "rheumatic," were attributable to specific organisms, notably *syphilis*, *gonorrhœa*, and *tubercle*.

The effect of this weeding out has been that gout and "rheumatism" have lost much of their etiological significance. Thus, formerly regarded as essential or proximate causes, they now rank rather as *predisposing* factors, whose presence aggravates the effect of traumatic and favours the occurrence of infective agencies. We see, therefore, that in this as in all other spheres of "chronic rheumatism" our attitude must be more eclectic, and that, instead of too readily assuming any form of bursitis to be gouty or "rheumatic," we should be loth to entertain the supposition until the more likely traumatic and infective processes, either singly or combined, have been satisfactorily excluded.

Lastly, it is not our purpose to deal exhaustively with all types of bursitis, but to confine ourselves to those formerly, and, indeed, still by many, held as "rheumatic" in nature.

Bursal Affections of Upper Limb.

Subacromial Bursitis.

Anatomical Relationships.—The symptomatology of this affection is so intimately dependent on the site and mechanical functions of the bursa that, to appreciate its significance, a brief prelude on this point is essential.

Like all other bursæ, the *subdeltoid* consists of a space in the connective tissue lubricated with a small amount of serous fluid, and the purport of its existence is the avoidance of undue friction.

Structurally, its outer coat is composed of connective tissue which blends intimately with, or rather is continuous with, the surrounding areolar planes, and is lined internally by a layer of endothelial cells. It is located under the acromion process, lies outside the capsule of the shoulder-joint, and, spreading over the great tuberosity of the humerus, extends outwards under the upper part of the deltoid muscle.

The floor or base of the bursa is inserted into the great tuberosity, and to it is also attached the supraspinatus tendon, while its upper surface or roof blends with the inferior surface of the acromion and the coraco-acromial ligament.

By many anatomists it has been assumed to consist of two portions—a subacromial and a subdeltoid—but, as Codman has

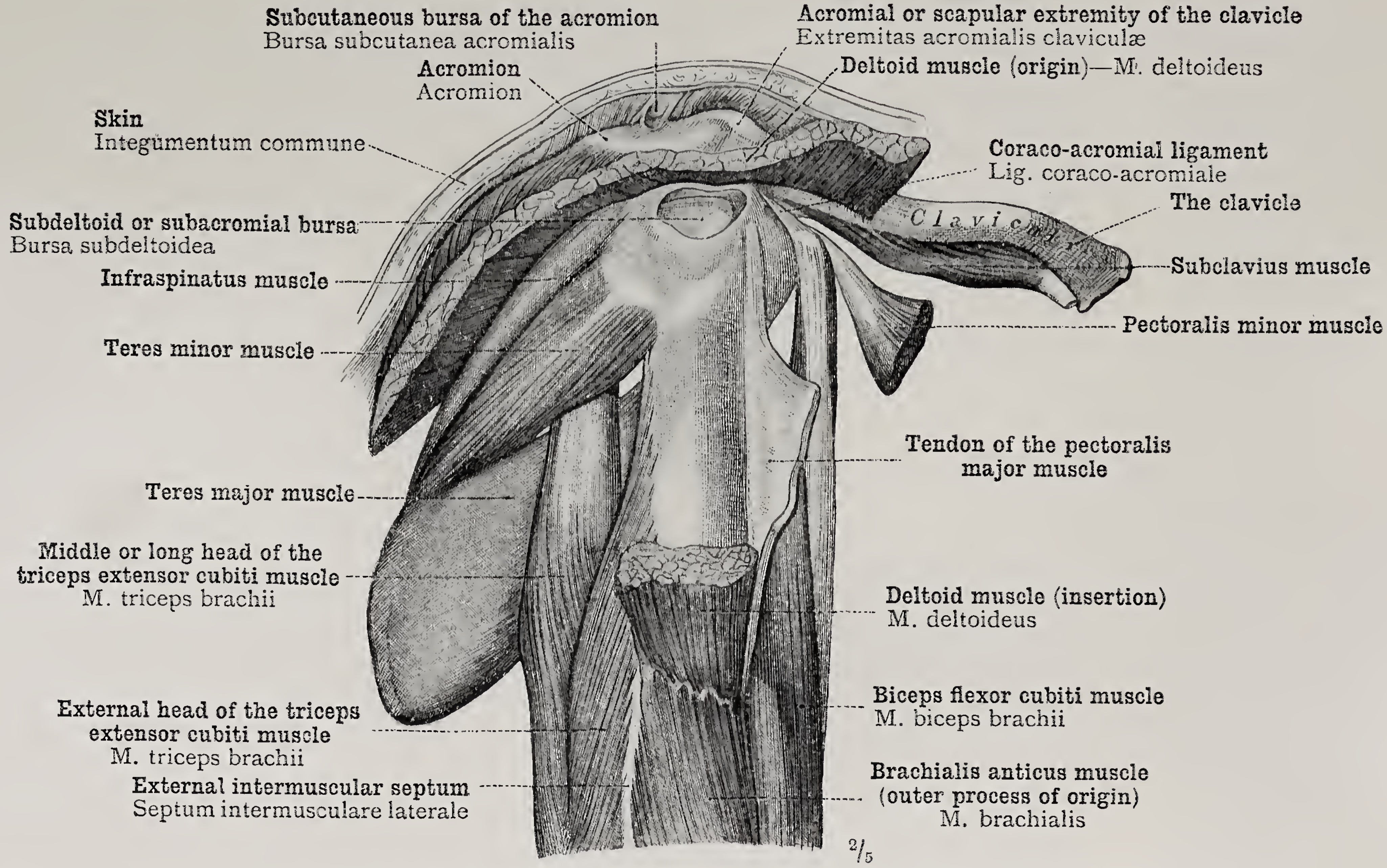

Subcutaneous bursa of the acromion
Bursa subcutanea acromialis
Acromion
Acromion
Skin
Integumentum commune
Subdeltoid or subacromial bursa
Bursa subdeltoidea
Infraspinatus muscle
Teres minor muscle
Teres major muscle
Middle or long head of the triceps extensor cubiti muscle
M. triceps brachii
External head of the triceps extensor cubiti muscle
M. triceps brachii
External intermuscular septum
Septum intermusculare laterale
Acromial or scapular extremity of the clavicle
Extremitas acromialis claviculæ
Deltoid muscle (origin)—M. deltoideus
Coraco-acromial ligament
Lig. coraco-acromiale
Clavicula
The clavicle
Subclavius muscle
Pectoralis minor muscle
Tendon of the pectoralis major muscle
Deltoid muscle (insertion)
M. deltoideus
Biceps flexor cubiti muscle
M. biceps brachii
Brachialis anticus muscle
(outer process of origin)
M. brachialis
2/5

Fig. 104.—Arrangement of the muscles adjoining the right shoulder-joint and in the proximal portion of the upper arm as seen from the outer side after the removal of the greater part of the deltoid muscle. Subdeltoid bursa, and subcutaneous bursa of acromion. (Toldt's Atlas.)

To face page 554.

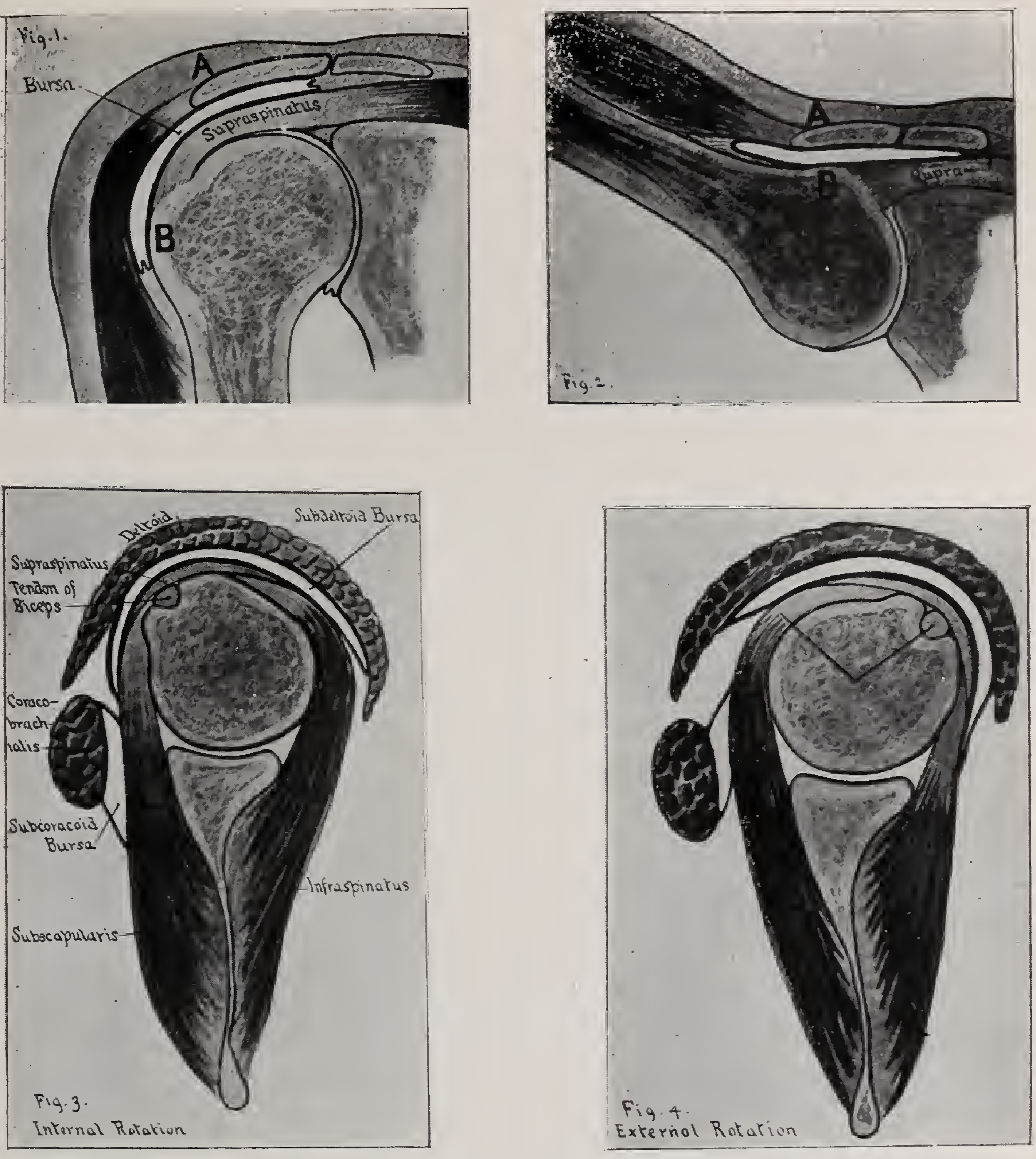


FIG. 105.

Fig. 1 is a diagram from a frozen section. Note origin of deltoid from edge of acromion ; also subdeltoid bursa with its roof formed of under-surface of acromion and fascia beneath upper portion of deltoid. Its base is formed by greater tuberosity and the tendon of supraspinatus.

Fig. 2 illustrates the state which would be found in complete abduction, the tuberosity having passed under the acromion and the point *B* having passed the point *A*. The elastic deltoid has taken up the slack at one end and the supraspinatus at the other. It is obvious that if the surfaces of the bursa between the points *A* and *B* in Fig. 1 were adherent, it would be impossible for the joint to pass into the position shown in Fig. 2.

Figs. 3 and 4.—A diagrammatic representation of a horizontal section through the head of the humerus to indicate the lateral extent of the bursa and the necessity for its existence to allow greater tuberosity to rotate beneath deltoid. Note the stretching of the infraspinatus tendon round the head of the bone in internal rotation and that of the subscapularis tendon in the opposite direction in external rotation. The stretching takes place really in the muscles which take up the slack of the capsule of the joint, not in the tendons. The capsule of the joint being made of the muscles and tendons, it can be easily understood how simultaneous spasm would lock the joint, as for normal motion one must relax as the other contracts. Note also the cross-section of the coraco-brachialis and the necessity for the subcoracoid bursa, which lies between it and subscapularis. Owing to the action of the muscles being at right angles to one another, bursa is indispensable.

(*Reproduced by kind permission of Dr. Codman, from the "Boston Surgical and Medical Journal" of 1906.*)

shown, the division is purely arbitrary, for they are but extensions of one and the same bursal cavity.

Thus, during *abduction* the whole bursa is subacromial, and embraces the so-called " subdeltoid " part, which in *adduction* lies external to the acromion, and hidden beneath the fibres of the deltoid.

Mechanical Functions.—The essential rôle played by the subacromial sac in movements of the shoulder-joint was but imperfectly realized prior to the publication of Kuster's monograph.

At the same time, however, it would be unfair to overlook the previous and pioneer work of Duchenne in France, and Cathcart and Cleland in this country, as these observers pointed out very clearly the relationships obtaining between this bursa and the coraco-acromial arch, and the important part played by the sac in facilitating the movements of the shoulder, more particularly *abduction.*

Thus, when the shoulder is alternately raised from or carried to the side of the chest, the tuberosity of the humerus passes in and out from under the coraco-acromial ligament, and in so doing carries the attached floor of the bursa with it.

For normally during this movement the bursal walls are rolled up so as to form a sort of collar, which passes beneath the coraco-acromial ligament in advance of the great tuberosity. Consequently, if the sac is sore, pain will be elicited, especially during abduction or elevation of the arm from the side. But when the walls are distended or thickened, abduction is either painful or impossible, owing to pressure of the bursa against the acromion.

The mechanical nature of the obstruction was shown experimentally by Baer, who, after injection of the bursa with wax, found that passage of the distended sac beneath the coraco-acromial ligament during abduction of the arm was impracticable.

At the same time, flexion, extension, and rotation of the shoulder are usually unrestricted, provided that the arm during these movements is kept close to the side.

Moreover, this power of flexion and extension is retained, even if adhesions have formed between the roof and the floor of the bursa, though, of course, abduction will be lost or diminished, as the normal gliding and rolling of the upper upon the lower layer of the sac are no longer permissible.

But, unlike flexion and extension, the power of *rotation*, if adhesions are present, is limited, even when performed with the hand lying straight by the side, and, of course, is either abolished or much restricted when attempted with the arm in a position of abduction.

To sum up these remarks on the mechanical function of the subacromial bursa: the characteristic disability attaching to disorders of this structure is *restriction or abolition of the power of abduction*, and also in some instances, to a variable degree, of *rotation.*

Etiology.

The condition may be either primary or secondary, and it is variously attributed to *traumatic, infective, or diathetic* causes.

Primary Types.—Duplay, who first isolated the affection, and held it to be a disease *sui generis* (*maladie de Duplay*), strongly upheld its *traumatic* origin. In his opinion, repeated direct or indirect injury to the bursa, by contusions or dislocations of the shoulder, brought about obliteration more or less complete of its cavity.

Kuster, to whom we are indebted for the introduction of the term "bursitis subacromialis," also contended for its purely traumatic causation, and Codman, too, in his more recent masterly monograph, assigns to injury an important etiological rôle.

Thus, as previously described, the supraspinatus is intimately related to the floor of the bursa, and the last-named observer has shown that partial or complete rupture of its tendon or avulsion of its insertion facets through muscular violence or direct injury to the shoulder is sometimes responsible for subacromial bursitis.

Personally, we strongly believe that in the majority of cases strain or injury of direct or indirect kind is the determining cause of the affection. Nancrede, indeed, years ago demonstrated by experiments that the walls of this bursa may be actually torn in twists of the arm, especially when either flexed or extended.

Still, while claiming trauma as the principal cause, it must be admitted that cases crop up in which no history of external injury is attainable; but the researches of Goldthwait apparently indicate that in some instances the damage received is of the nature of an "internal traumatism." This observer has noted that the acromion process presents *wide variations in length and direction*, and that such, moreover, are not without their mechanical effect.

Thus, given an unduly long acromion, and especially one placed more at the back of the joint than normal, then movement of the arm upwards and backwards will naturally be interfered with. For, obviously, during its performance the great tuberosity of the humerus must come into forcible contact with the acromion, and the bursa, which intervenes, suffers therefore more or less constant and unusual irritation.

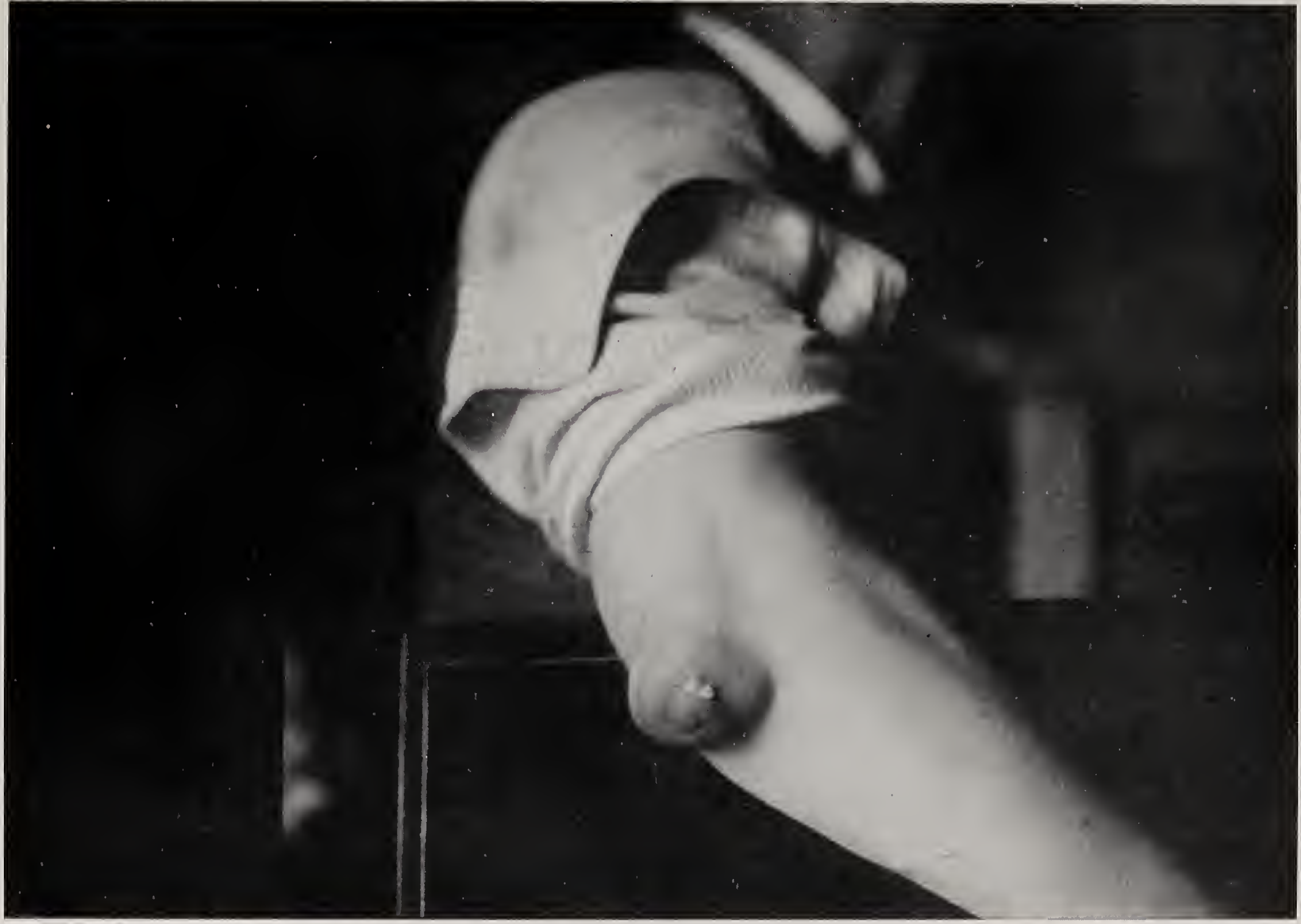


FIG. 106.—Gouty inflammation of the bursa over the olecranon.

To face page 556.

This, of course, greatly enlarges our conception of the rôle played by trauma, in that Goldthwait has by his anatomical researches ascertained that such peculiarities in shape are by no means uncommon.

But while conceding the frequency and efficiency of trauma as a cause, yet it must be admitted that in some instances it probably acts by favouring local infection.

That bursæ are favourite sites for *infective* processes is well established, and it is quite conceivable that organisms carried thereto by the circulation may lie latent until some slight injury calls them into activity.

Of specific infections, *post-scarlatinal rheumatism* has been singled out as a relatively frequent antecedent, also *gonorrhœa*, while we are all aware that *tuberculous disease* may affect this bursa, either primarily or secondarily to disease of the shoulder-joint.

Apart from this, there are other features suggestive of an infective source, more especially the frequency with which this form of bursitis has been met with in sequence to or in association with *acute tonsillitis or pharyngitis.* A. Schwarz was strongly impressed with the intimacy of the connection, and noted that, either subsequently or actually during the progress of the acute throat affection, the shoulder on the same side became stiff and the region of the bursa tender to pressure, and that the sensitiveness sometimes subsided with the pharyngeal symptoms.

In addition, it is by no means improbable that in some instances the bursitis is the outcome of *toxic absorption or subinfection from the alimentary tract.*

Now as to the relationship of *gouty* and *rheumatic* diatheses, to which most writers assign a prominent etiological rôle. As regards *acute articular rheumatism,* as far as we know, no relation between it and bursitis has been demonstrated, and in our opinion, therefore, the term " rheumatic " bursitis should be expunged from medical nomenclature.

In regard of *gout,* we are on more certain ground by reason of its marked proclivity for affecting bursæ, but, as far as we know, uratic concretions have not been demonstrated actually *in situ,* as in the case, for example, of the bursa related to the olecranon, etc. While gout of itself may be an adequate cause of the affection, we rather incline to believe that the more common rôle it plays is that of aggravating the inflammatory changes which ensue secondarily to trauma.

Secondary Types.—The subacromial bursa is very prone to be involved secondarily by extension of disease from neighbouring structures. Thus, it may complicate *gonococcal, tuberculous,* or any other form of infective arthritis of the shoulder-joint.

In this connection, too, *osteo-arthritis* calls for especial notice, the bursa becoming inflamed owing to the mechanical irritation set up by exostoses sprouting from the contiguous bones. Again, sometimes it is a sequel of dislocation or fractures of the head of the humerus, or more particularly of the great tuberosity. Also, as Duplay pointed out, it may be the outcome of an extension from a fibrositis of the superimposed deltoid, constituting the condition termed by him *la périarthrite scapulo-humérale*, in which the muscles and their related bursæ, as well as the capsule of the joint, are matted together by a chronic inflammatory process.

Clinical Account.

Despite the variety of the etiology, the symptoms produced are fairly constant, whether the condition be due to traumatic, infective, or diathetic causes.

The onset, save in instances clearly attributable to strain or injury to the shoulder, is insidious, and very commonly referred to chill, exposure, or overuse.

The course pursued is variable; it may be acute, subacute, or chronic, and not uncommonly cases, which are mild to begin with, subsequently, either through neglect or improper treatment, develop into some of the most severe forms.

Acute Types.

In these cases, with local inflammatory changes of high grade, there is present constant severe pain, local sensitiveness, and limitation of movement from scapulo-humeral spasm. The pain is greatly intensified, especially when active or passive attempts at *abduction* are essayed, in which case it becomes excruciating. It is located in the outer region of the shoulder near the acromion, or it may be referred to the insertion of the deltoid, though it sometimes radiates down the limb as a diffuse brachialgia, or predominates in some special nerve trunk.

The suffering is severe, and instinctively the subject, whether standing or lying, retains the limb in a sling position. His rest is broken, for with sleep the vigilance of the muscles relaxes, the bent elbow uncurls, and, the limb rolling passively outwards, increased strain necessarily falls on the inflamed structures, and he is recalled to consciousness and renewed distress.

As to the cause of the diffuse or localized brachialgia sometimes present, opinion is somewhat divided, some ascribing it, and we think too readily, to extension of the morbid process to the nerve sheaths, while others, with whom we are in accord, deem it susceptible of a more simple explanation.

Thus, in *acute* types the patient instinctively adopts the sling position, with the arm closely pressed against the chest wall. This forced adduction, by compressing the nerve trunks between the arm and the chest wall, accounts, we believe, for the obstinate pain often experienced along the distribution of the ulnar nerve.

Goldthwait, too, has drawn attention to an interesting feature in these cases—viz., that the affected shoulder is always carried in a *forward or drooping* position, and that, moreover, the amount of pain experienced is proportionate to the extent of this downward and forward sagging.

Now, it is clear that, given continuous spasmodic adduction combined with sagging downwards of the humerus, the pain suffered is quite reasonably accounted for by compression of the nerve trunks between the humerus and the ribs.

The mechanical or static origin of the pain is strongly suggested by its intractability to internal treatment, and, on the other hand, by the striking way in which relief is afforded by the instinctive adoption on the part of the patient of postures calculated to relieve this pressure. Hence their habit of resting the elbow on the table so as to prop up the drooping shoulder, while they quickly learn when lying down to prevent extreme adduction by placing a pillow between the arm and side.

That the pains are due to an extension to the nerve sheaths is, we think, unlikely, for the humerus largely intervenes between the inflamed bursa and the nerve trunks, the direct involvement of which, moreover, we would expect to be marked by signs indicative of their implication. But as a matter of fact, if carefully investigated, how seldom do we find tenderness of the nerve trunks to pressure, much less objective motor or sensory changes!

Local Signs.—Tenderness to pressure is present, and extends over the anatomical limits of the bursa, but the maximum sensitiveness is located over the great tuberosity, *just below the acromion process and external to the bicipital groove.*

If now it be possible to passively elevate the arm above the level of the shoulder, this point of extreme sensitiveness disappears. That it can no longer be elicited is due to the fact that the inflamed bursa during abduction and elevation of the arm passes beneath the coraco-acromial arch, and therefore lies out of reach of the examining finger. The tender spot, of course, reappears with depression of the arm, and this useful sign is, we consider, an outstanding and distinctive feature of subacromial bursitis. This sensitiveness to pressure is often exquisite, and places sleeping or lying on the affected side out of question.

Limitation of mobility is, of course, always present to a greater or less degree. It is the more marked if the scapula be fixed, when the range of abduction from the side of the chest can rarely proceed beyond 10 degrees. At the same time, the movement of adduction, as exemplified by placing the hand on the opposite shoulder, is quite feasible. Rotation outwards, as in brushing the hair or in fixing the collar at the back of the shirt, is painful or difficult.

The same is true of internal rotation, as in fastening the braces behind. As opposed to this difficulty in performing abduction and rotation, antero-posterior flexion and extension, like adduction, are untrammelled, always providing that the arm be carried in a straight line forwards and backwards.

Effusion into the sac may be masked by the overlying tissues, but in several cases which have come under our notice the outline of the distended bursa was not only palpable, but visible.

The swelling is delimited by the extent of the bursa, and is most prominent laterally under the deltoid, while there is an absence of fulness over the head of the bone in front, and the humero-pectoral groove remains distinct.

Buckley, in a recent contribution, has noted that in skiagraphs the relationship of the head of the humerus and the coraco-acromial arch is somewhat altered. Normally these two structures are in close contact, but in subacromial bursitis, if of some duration, a gap is discernible between the arch and the head of the humerus.

He suggests that it may be due to an instinctive relaxation of the muscles, so as to obviate pressure on the inflamed surfaces, or possibly in some instances to effusion into the bursa.

Course of Disease.—With the decline of the acute symptoms the scapulo-humeral spasm gradually subsides, but the local tenderness beneath the acromion persists. It may now be possible to abduct the arm, and if so no pain will be experienced until it is elevated to the point at which the inflamed bursa becomes engaged in the acromial arch.

Pain will then be felt, and muscular spasm so intense as to forbid the continuance of the movement. But if capable of being proceeded with, it ceases when the bursa has passed from under the coraco-acromial ligament. Albeit, when during the descent of the arm to the side the bursa has again to negotiate the passage beneath the arch, the same pain is again experienced. This sign is, of course, only to be elicited as long as this spot of *local tenderness* exists, but when present it is of great diagnostic help.

In the most severe forms, the muscular spasm may persist so

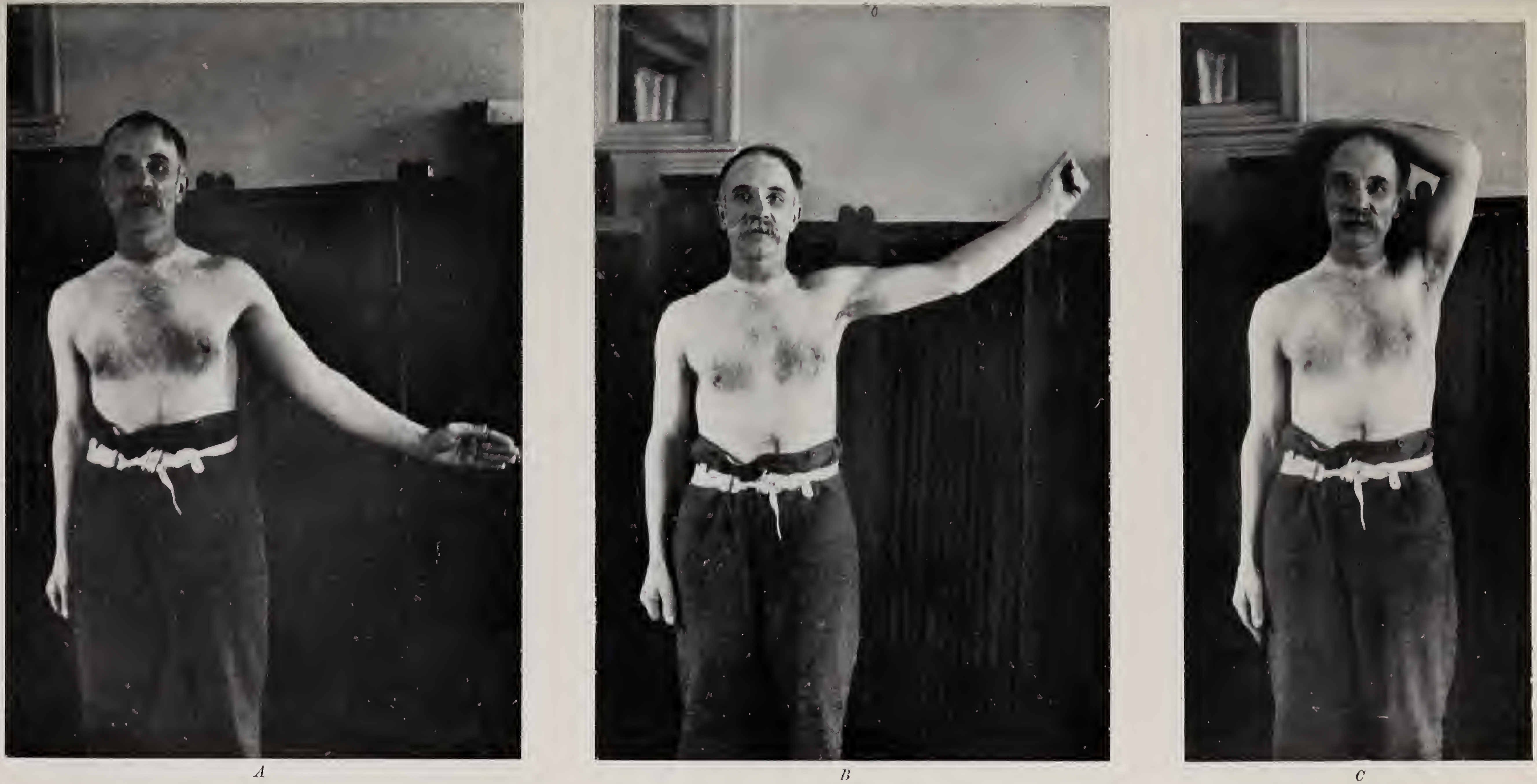


Fig. 107.—The position of the left arm in *A* indicates extent of painless movement in subacromial bursitis. The further elevation of the arm to the position indicated in *B* is attended by extreme pain, which, on still higher elevation, tends to progressively decrease until the subject finds complete ease in the pose assumed in *C*.

To face page 560.

long that adhesions form, and, according to Codman, such untoward results more often ensue in cases due to trauma or gonococcal infection.

Chronic Types.

In these varieties the sac may undergo distension constituting a form of hydrops, or else a gradual thickening of its wall may ensue, or adhesions may form between the opposing layers of the bursa.

The inflammatory process in these cases being more subdued, pain is less severe, constant, and spontaneous, than in the acute forms. It is more clearly dependent on posture, and, while aggravated by certain positions, is wholly or partially relieved by a change of attitude. In keeping with this, the limitation of mobility—abduction—is here determined not so much by pain as by the mere mechanical hindrance offered by the distended, thickened, or adherent bursa.

In an instance of this nature recently under our care, the visibly enlarged bursa was absolutely painless, but through its rumpling up against the acromion full abduction was mechanically prevented. In this particular case the patient suffered little pain, yet because of the restricted mobility she readily submitted to excision of the thickened bursa, with complete restoration of her power of abduction.

Where the condition of chronic hydrops prevails, the distended sac gives rise to a soft fluctuating swelling beneath the deltoid muscle, which sometimes contains melon-seed bodies. In such cases, which are commonly tuberculous, a soft creaking or crepitating sensation is to be evoked on manipulation or movement of the shoulder.

When the surfaces of the sac are glued together by adhesions, the symptoms are exactly similar, save that rotation, even in the adducted position of the arm, is limited, and if very extensive both rotation and abduction may be narrowly restricted or wholly lost.

As opposed to this restriction of abduction, and, if adhesions are present, of rotation also, we have to observe that, if the arm be held in a position of adduction, flexion and extension in the antero-posterior plane are still feasible.

Codman, in his laborious and exhaustive studies of the affection, draws attention to yet another type of the disorder. In this variety the salient characteristic is the *retention of a normal range of movement*, but with this the exercise of the arm is painful. This condition he believes to be due to slight unevenness in the contour of the base of the bursa, usually just outside the bicipital groove.

Hence the arc of motion, though not restricted, is, instead of being smooth and unhampered, checked as this irregular surface passes under the acromion. Thus, abduction and external rotation are little if at all limited, but at some point during their performance acute pain is felt, which ceases as soon as the tuberosity is safely beneath the acromion, but in lowering the arm the sensation is again experienced.

This sign in these chronic cases is not always demonstrable, and, according to Codman, is more frequently elicited during lowering of the arm. Also it is more certainly evoked by abduction of the arm in internal rather than in external rotation; hence the patient, if he wishes to raise the limb, rotates it externally before attempting to abduct it.

Duration.—This varies according to the etiology of the particular case, and largely depends on the judgment displayed in treatment—viz., how far one is successful in hitting off the happy mean between too prolonged fixation or rest on the one hand, and premature or too vigorous exercise on the other.

In cases due to trauma, if we except their tendency to be complicated by adhesions, the duration is less prolonged than in those cases which arise insidiously, and are due to diathetic or toxic causes.

It is comforting to record here Codman's view, that in these adherent types the disability seldom lasts over two years, and in favourable cases—namely, those without secondary contractures—only six to twelve months.

Lastly, in our experience these cases of subacromial bursitis are amongst the most troublesome we have to deal with, the condition being one of the most common causes of stiff and painful shoulders. That they are obstinate and often very intractable to treatment is undeniable, but, if given the endless care and supervision they require in the early stages, a few weeks only will represent their probable duration.

Subcoracoid Bursitis.

The inflammatory changes that ensue in this bursa have to a certain extent been overshadowed, owing to the almost exclusive prominence accorded by most writers to similar affections of the neighbouring and more extensive subacromial sac. Recent and closer observations, however, seem to indicate that the subcoracoid bursa is equally if not even more liable to the effects of injury. Bursæ, as we know, exist to facilitate the smooth gliding over each other of contiguous bony processes, and this particular sac—the subcoracoid—intervenes between the tip of the coracoid process and coraco-brachialis muscle and that portion of the capsule of the shoulder-joint which overlaps the lesser tuberosity of the humerus.

Etiology.

Lying as it does in a more sheltered position than the subacromial bursa, this sac is much less liable to injury by direct violence, though its relative immunity in this respect is largely discounted by the frequency with which it suffers damage through strains of the neighbouring coraco-brachialis muscle. Codman has met with this lesion on several occasions in truck-drivers, through the strain imposed on the adjacent coraco-brachialis by pulling horses.

A more interesting aspect of the etiology, however, has been recently ventilated by Goldthwait, who believes that certain anatomical and mechanical factors predispose to its development, or may, indeed, initiate the disorder without the intervention of any other pathological process.

Thus, he remarks that in most anatomical plates the coracoid process and the humerus are portrayed as being separated from each other by a considerable space. This he believes to be inaccurate, and, while admitting that it may be so in dissected specimens, contends that in the normal relation of the parts it is not so, and the bones are in more or less close contact.

The intimacy of the apposition depends upon—(1) the position of the shoulder, whether erect or drooping; and (2) the actual shape and angle presented by the coracoid process.

If the shoulder is held erect, and thereby the scapula forced back upon the ribs, the coracoid process and lesser tuberosity are not in contact unless the arm is rotated in or adducted, but the intervening gap is very slight. But if the shoulder is allowed to droop, the scapula rotates forwards, outwards, and downwards, and coincidently, of course, the coracoid process droops downwards and forwards, and the apposition of the two bones becomes more intimate and constant.

The second factor is the extreme variation in the length and angle of the coracoid process, which may be short and project upwards, or long and incline downwards. In presence of the latter peculiarity it is clear that, when the arm is carried forwards, the small tuberosity of the humerus will come sooner and more forcibly into contact with the coracoid process than if it were short, with an upward inclination.

Now, given a drooping shoulder, or a long and downwardly-inclined coracoid process, or both conditions combined, it is obvious that compression of the bursa between the lesser tuberosity and the coracoid process is distinctly promoted, and frequently undue irritation results. Naturally, its occurrence is favoured by occupations which entail constant or forcible jamming of the lesser tuberosity against the coracoid process, and Goldthwait believes that this explains why, in his opinion, the subcoracoid more than any other bursa round the shoulder-joint is prone to suffer from inflammatory changes and injury.

Clinical Account.

As in the allied condition, subacromial bursitis, the chief symptoms are pain—local and referred—and limitation of movement.

The onset may be more or less sudden, or insidious and gradual.

The pain, generally speaking, is in the front of the shoulder, but it may be referred to the deltoid region or to the arm and hand. With it is associated tenderness, just *below or outside the tip of the coracoid process.*

In the acute stages, limitation of movement is necessarily imposed by the pain and muscular spasm, and the former is markedly aggravated by all efforts which call into action the adjacent coraco-brachialis—viz., movement forwards of the arm and forced adduction. The subsequent course of the disease varies, but in favourable instances the pain and limitation of movement gradually disappear.

But where adhesions have formed, the restriction of mobility persists, though not necessarily accompanied by pain, save when traction on the bands occurs. The limitation takes place chiefly in rotation both outwards and inwards, and this indifferently, whether it be attempted with the arm at the side or in a position of abduction.

The disabilities imposed are precisely similar to those met with in subacromial bursitis, when through adhesions rotation as well as abduction is hampered. Hence the difficulty these patients experience in putting on their coats, or placing the hand behind to button braces, etc.

On the other hand, flexion or extension of the arm in a straight line backwards or forwards is feasible, provided the bursa be not acutely inflamed, and in the same way abduction in a straight line from the body is possible.

As to the associated brachialgia met with in these cases, it probably admits of the explanation vouchsafed in regard of the subacromial type—viz., that it is of postural or mechanical origin.

Lastly, Goldthwait, to whom we owe so much in regard of these affections, strongly emphasizes the serious secondary effects that follow firm and extensive adhesions at the site of the subcoracoid bursa.

For it lies, as we have seen, between the coracoid process and lesser tuberosity, the capsule of the shoulder intervening, and so adhesions when formed glue the latter to the coracoid process. The result of this is that the stability of the shoulder-joint is undermined, for the tip of the coracoid process becomes the pivot for all its movements. Under these altered mechanical conditions, and especially if there be any laxity of the shoulder capsule, there is a distinct tendency to the occurrence of *dislocation* when the arm is raised and at the same time rotated.

Diagnosis.

The identification of these various lesions demands *careful inspection and direct examination of the shoulder-joint.* It is best achieved by seating the patient in a low chair, and then the physician, looking down on the shoulder from above, will be able to appreciate any alteration in its contour. If swelling be present, it should be noted whether it is situated mainly in front of the joint, or projects more laterally under the deltoid. Other points to note are the presence or absence of the groove between the pectoral and deltoid muscle, and the existence or not of the normal depression below the acromion. Careful palpation should enable us to locate the site of tenderness, whether *subcoracoid* or *subacromial*, and at the same time the presence of any distension or thickening of the bursal walls. The axilla also should be examined, and any shallowness or fluctuation not overlooked. Careful consideration of these various points will afford us valuable information as to the disorder, whether it be intra- or peri-articular and bursal in site.

The investigation of mobility must next be undertaken, and, inasmuch as any restriction may be largely masked by rotation of the scapula, this must be fixed. Presuming the right shoulder to be affected, the physician, still standing behind the patient, rests the elbow with the forearm bent in his right hand. He then places his left palm on the acromion, letting his fingers rest in front on the neck of the humerus, while his thumb lies on the head of the humerus behind. The left hand thus serves to fix the scapula, while the right is free to move the arm passively, and in this way may be ascertained the degree of movement present in the joint and the direction of any existing limitation.

We shall now pass on to indicate the salient features of the subacromial and subcoracoid types, and subsequently shall deal with the differentiation of the various disorders likely to simulate these conditions.

Subacromial Bursitis.

Etiology.—Predisposing factors are a gouty or rheumatic diathesis, also drooping shoulders and abnormalities of shape and direction in the acromion. The exciting causes comprise *injury*, direct or indirect, with probably often a superadded factor of infection.

Onset.—This may be acute, but more often it is insidious.

Symptoms and Signs.—Pain situated in the outer region of shoulder, or referred to insertion of the deltoid or to arm and hand, is present. In *acute* types there is *tenderness over the great tuberosity just below the acromion and outside the bicipital groove.* Swelling, if present, is most prominent laterally under the deltoid muscle, while there is an absence of fulness over the head of the bone in front. The normal groove between the deltoid and pectoral muscles is distinct. In *chronic* types the pain is less severe and more dependent on posture. Local tenderness is sometimes absent. Distension or thickening of sac, with or without adhesions, is found. Sometimes crepitation or creaking on palpation can be elicited.

Mobility.—In *acute* stages limitation of mobility in all directions is present, owing to the intense muscular spasm. With the decline of the latter, and in *chronic* types, *limitation of abduction* is most evident; but if adhesions be present, rotation is also limited or lost. But in both instances the movements of antero-posterior flexion and extension are still retained. If *tenderness* of the bursa be present, pain ensues at the point when, during abduction or descent of the arm, the inflamed sac becomes engaged at the coraco-acromial arch.

Skiagraphy.—This is negative save when the walls of the bursa are calcified.

Subcoracoid Bursitis.

Etiology.—Strain of the coraco-brachialis tendon and *internal traumatism* from concussion of the lesser tuberosity against the coracoid process are the factors most frequently met with.

Symptoms and Signs.—Pain in front of the shoulder, but sometimes referred to the hand or arm, is present. It is aggravated by forward flexion and forcible adduction of the limb by the coraco-brachialis. *Tenderness just below or outside the tip of the coracoid process* is to be elicited on pressure. With the

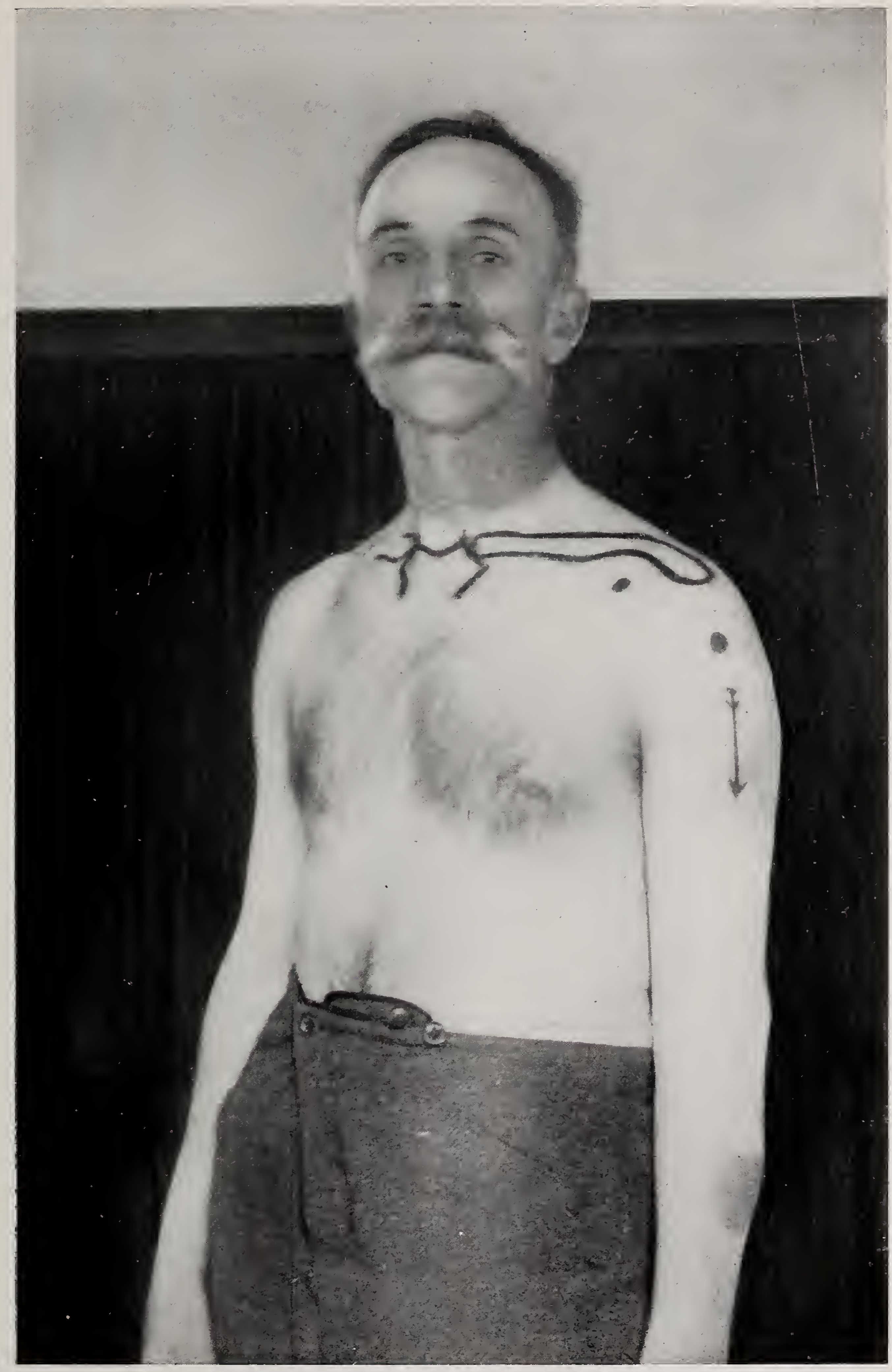


Fig. 108.—Showing points of maximum sensitiveness in subcoracoid and subacromial bursitis.

To face page 566.

decline of the acute stage, if adhesions be present, *limitation of rotation* ensues. but abduction of the arm is possible if it be performed without rotation.

Differential Diagnosis.

The chief disorder that has to be distinguished is chronic synovitis of the shoulder-joint, and it is, of course, highly important to ascertain whether the bursitis has arisen *secondarily* to a fracture, osteo-arthritis, or tuberculous disease of the neighbouring articulation.

Synovitis of Shoulder.

This may present considerable difficulties, only to be overcome by most careful analysis of the physical signs.

In *subacute synovitis with effusion*, the swelling, unlike that of subacromial bursitis, does not project laterally under the deltoid. The fulness is located more over the head of the bone in front, and is often most marked near the anterior margin of the deltoid. The humero-pectoral groove, too, becomes indistinct, the depression below the acromion behind is lost, while the axilla may feel shallower than normal and fluctuation be appreciable.

The maximum sensitiveness in synovitis is *below and to the outer side of the coracoid*, whereas in subacromial bursitis it is just *below the acromion and outside the bicipital groove.*

The limitation of movement in synovitis is generally in *all* directions, but in the subacromial affection the distinctive feature is *limitation of abduction.*

In *subcoracoid bursitis*, as in the subacromial type, the distinctive features are the tenderness and swelling localized to the affected structures, while the limitation of movement obtains only in certain directions—in this particular instance, *rotation inward and outward.*

The tenderness in subcoracoid bursitis, it is true, coincides with that typical of *synovitis ;* but the limitation solely of *rotation*, and the retention of perhaps the full range of flexion, extension, and abduction should suffice to distinguish the periarticular or bursal site of the disorder.

Torn Shoulder Capsule.

On this point a brief digression is necessary, for recently Thomas, as the result of experiments on the cadaver and post-mortem examination, claims that the symptoms deemed typical of *subacromial bursitis* may be exactly reproduced as the result of this lesion.

Thomas states that " a periarthritis from tears of the axillary portion of the shoulder capsule, due to forced abduction, offers the best explanation of the stiff and painful shoulders, with loss of power in the arm." This casualty is usually produced during a fall in which the subject, in order to save himself, clutches at some object with his arm in a position of *abduction.* Under such circumstances a tear of the axillary portion of the capsule is likely to occur, which may or may not be accompanied by a subluxation, or even an actual dislocation of the head of the bone into the axilla. Even if the latter does occur, it is automatically reduced as the arm sinks to the side.

The clinical features, according to Thomas, are sudden effusion into the joint, which, of course, takes on the usual characters of a synovitis in this articulation. Restriction of mobility is almost absolute, and due, of course, at this stage to scapulo-humeral spasm; but when the spasm declines, however, limitation is still present, but at this later period is due to shrinkage or retraction of the axillary portion of the capsule.

Now, it is quite clear that a cicatrix of this nature in this portion of the capsule will obviously have for its chief characteristic limitation of *abduction,* hence its similarity to subacromial bursitis. The distinguishing features in the acute stage are the following:

Unlike subacromial bursitis, in which the tenderness is below the *acromion* and *external* to the joint, in the case of torn capsule the tenderness to pressure is in the *axilla,* and, of course, *internal* to the articulation.

Incidentally there is, of course, also by reason of the contiguity of the capsular lesion to the nerve trunks, a great liability to accompanying brachial neuralgia or neuritis.

There is limitation, *not only of abduction, but in addition of rotation,* this contrasting, of course, with subacromial bursitis, in which the former movement alone is impaired. Furthermore, there is *restriction in the direction of flexion and extension,* which movements, however, in the case of bursitis, are unhampered if carried out in the sagittal plane of the body.

In conclusion, the most characteristic sign of a torn capsule would appear in the early stages to be axillary tenderness as opposed to subacromial, with also the signs of synovial effusion, and in the terminal stages limitation not only of abduction, but of rotation also.

We thus see that, from the point of view of mobility, *restriction of abduction* is most distinctive of subacromial bursitis, *limitation of rotation* most typical of subcoracoid, and *combined limitation of both rotation and abduction* of a laceration of the axillary region of the shoulder capsule.

Circumflex Paralysis.

Confusion of this disorder with subdeltoid bursitis may occur, but should be differentiated by the following features:

In subdeltoid bursitis, although the patient may not be able to raise his shoulder, still, when he makes the attempt, the fibres of the wasted deltoid can be felt to *contract.*

On the other hand, in circumflex palsy there is an absence of such contraction, and also of pain, while sometimes there is *anæsthesia* over the lower part of this muscle.

Secondary Types of Bursitis.

Where the bursa has become inflamed by extension from a pre-existing deltoid fibrositis, close examination of the muscle will disclose the presence of *nodules* in its substance.

As regards *tuberculous* disease of the head of the bone this may be difficult of exclusion, as the bursa is frequently involved. But in such cases the fixation is more absolute than in subdeltoid bursitis, in which there is always a certain amount of movement possible, while the scapulo-humeral muscles do not undergo such extreme atrophy.

The X-ray appearances fortunately are characteristic, whereas skiagraphy in subdeltoid bursitis is generally negative, unless the walls of the sac have undergone calcification.

Other conditions, to exclude which skiagraphy will be indispensable, are *osteo-arthritis* of the shoulder-joint and *fractures,* especially of the greater tuberosity.

Bursal Affections of Lower Limbs.

These in the lower as in the upper limb are very prone to undergo inflammatory changes, and the local and referred pains they give rise to are but too frequently misinterpreted and attributed to rheumatism and gout. Generally speaking, however, *injury or mechanical irritation* is responsible for their production, and though the influence of *gout* as a causal or aggravating factor is admitted, there attaches but little weight to similar claims advanced on behalf of a *rheumatic* diathesis. In addition, also, we have to remember the marked liability of bursæ to *local infections.*

Subgluteal Bursitis.

Of the numerous bursæ which enter into relation with the great trochanter, the most important is that which intervenes between the gluteus maximus and the bone. The sac is often of considerable size and multilocular. Its site renders it especially open to trauma, though it is sometimes attacked by tuberculous or syphilitic disease.

Scudamore also claimed that he had observed these gluteal bursæ to become distended and exquisitely tender in gouty subjects, and that, though they might undergo sudden subsidence, they often remained permanently enlarged.

Symptoms.—In regard of the common type, due to trauma, it is worthy of note that the bursitis often does not manifest itself until a considerable period after any local bruising that may have been present has disappeared.

When acutely inflamed, pain is experienced on moving the limb, the range of mobility of which is diminished, while the patient walks with a slight limp. The pain is intensified by extension and abduction of the thigh, owing to compression of the tender bursa by the gluteal muscle.

Consequently, in order to procure ease, the thigh is generally kept *flexed and adducted.*

Local Signs.—These are swelling over and behind the great trochanter, which obliterates the usual hollow, and may be lobulated and very diffuse. The bursa may be found hard and infiltrated on palpation, and the neighbouring muscles somewhat rigid.

Exquisite sensitiveness to pressure is present, and evokes pain, which radiates down the limb. In its further course the swelling either tends to subside and disappear, or recurring attacks of inflammation may lead to great thickening, while, of course, in those instances of tuberculous or infective nature suppuration may occur.

The importance of the affection for us resides in the liability of its local and referred pains to be confounded with *lumbago* or *sciatica*, a source of fallacy only to be avoided by adhering to the invariable rule of making a local examination in all cases of lumbar or sciatic pains.

Of other bursæ in the neighbourhood of the hip-joint, the one beneath the *ilio-psoas* tendon must be borne in mind, as sometimes it becomes inflamed through a slip or fall.

The symptoms are pain, tenderness, and sometimes swelling, located in the upper and inner part of thigh and groin. It is relieved by *flexion and rotation outward* of the limb.

Patellar Bursitis.

This is sometimes said to be due to "rheumatism," but there is no evidence of a "rheumatic" source, but, on the other hand, it may undoubtedly be the seat of *acute or chronic gout*. Otherwise it originates, of course, usually from *friction*, though it may be invaded by syphilis, *gonorrhœa*, or tubercle.

Like the foregoing or prepatellar bursa, the one intervening between the ligament and the tibia is sometimes attacked by gout, and care should be taken not to dismiss as "rheumatic" that type frequently met with in young children as a consequence of trauma or strain. It may be recognized by the pain which ensues on full extension, with tenderness referred to the region of the tubercle, and swelling protruding on either side of the patellar ligament.

It is important also to differentiate between this form of bursitis and traumatic lesions involving the growing and partly ossified tubercle of the tibia (so-called "Schlatter's disease").

The *bursæ in the ham* are usually only implicated *secondarily* to disease in the joint, and their enlargement should always suggest its existence, but the swellings are often overlooked through failure to examine the popliteal space.

Post-Calcaneal Bursitis.

This particular form, sometimes known as "achillodynia," is frequently met with in *gout*, and also in *gonorrhœal rheumatism*, and Schwarz also states that even as a result of *tonsillitis* it frequently becomes inflamed.

The symptoms are pain and tenderness at the back of the heel, with a tender swelling between the tendo Achillis and the upper portion of the tuberosity of the os calcis. The pain is aggravated by standing on tiptoe and by plantar flexion of the foot.

In the present War one has seen several instances in soldiers invalided home under the impression that they were suffering from rheumatism. The pain frequently is completely absent during rest, and only appears on walking or standing.

Before conceding its gouty or infective origin, we should be careful to exclude pressure by an ill-fitting boot, which, both in children and adults, is a common cause of the disorder.

In conclusion, we have dealt at length with these bursal affections as their importance and frequency are under-estimated, and it is, moreover, clear that structures so intimately related to joints and muscles are peculiarly liable to lose their identity, and be overshadowed or confounded with disease of these parts. To be alive to their existence and anatomical location will go far to prevent such misconception, while to realize their importance we have only to reflect on the essential nature of the rôle they play in facilitating the mechanical functions of the joints and muscles related to them.

Diagnosis.

By close attention to the clinical symptoms and phenomena contained in the foregoing descriptions, identification of these various bursal lesions should prove comparatively easy, though the establishment of their individual etiology will entail careful consideration of the history, especially in relation to gout, trauma, or infective processes.

In regard of *differential diagnosis*, the only types that call for mention are the *subgluteal*, *ilio-psoatic*, and *post-calcaneal* types.

Of the two former, their contiguity to the hip-joint may lead to confusion with disease of this articulation, while their close vicinity to the anterior crural and sciatic nerve trunks respectively may lead to confusion with crural and sciatic neuralgia.

In the same way post-calcaneal bursitis is often confused with sciatica, though careful physical examination should suffice for the avoidance of this not uncommon fallacy in diagnosis.

Treatment of Bursitis of the Upper Limb.

Subacromial Type.

This, the most painful and disabling type of " rheumatic " bursitis, is perhaps also the most troublesome and difficult one to treat successfully. In its early stages the treatment is precisely similar to that advocated for acute brachial or deltoid fibrositis, of which it is not so uncommonly an accompaniment or sequel.

It need hardly be said that any *local foci of infection* or toxic absorption in the mouth, throat, or accessory cavities, or elsewhere, should be radically treated in view of their possible causal relationship. This should always be carried out prior to the consideration of medicinal measures, which as a rule, save for the relief of pain, are hardly indicated in this affection; on the contrary, it principally demands what are regarded as surgical procedures.

If, however, for example, there should be any *gouty* substratum, it should not be overlooked, and in the same way any *functional derangements in the alimentary canal* should be intelligently treated in accordance with their special indications.

For the relief of pain we should, as far as possible, rely on *local* measures, and if drugs be necessary, a full trial should be given to aspirin before resorting to morphia.

All the foregoing considerations must be regarded as purely subsidiary to, and not as substitutes for, the following measures.

Local Treatment.

Relief of Pain—Acute Stages.—Just as in the case of an inflamed joint, *rest* will prove our most effectual means in allaying the pain in the inflamed bursa. The most advantageous position in which to retain the affected limb is one of *abduction.* In this way we secure relaxation of the overlying deltoid and short rotators of the shoulder, while at the same time minimizing or obviating the pain that results from pressure of the inflamed bursa against the acromial arch.

If the subject remain in bed, we can most easily attain our object by placing a pillow at right angles to his body, while he lies in a recumbent position, and then allow the arm to rest upon it in a position of abduction.

Codman, on this point, advocates *fixation* of the limb in a position of abduction, and uses for this purpose a splint originally introduced many years ago by Monk. The accompanying plate, for which we are indebted to Dr. Codman, illustrates its mode of application.

He speaks highly of its efficiency in relieving pain, but because of the fear of adhesions it must as soon as possible be dispensed with either wholly, or be removed once daily, and the arm carried passively throughout its whole arc of movement,

As accessory measures for the relief of pain in the acute stages, dry heat, fomentations, or intensive irradiation, with anodyne applications, must be perseveringly employed.

Passive Movements.—The fear of adhesions resulting in these cases through too prolonged rest is but too well founded. Yet, when great pain and scapulo-humeral spasm are present, attempts at passive movement are only likely .to kindle the inflammatory process to greater intensity. With its decline, however, they must be practised twice daily, and carried out unflinchingly throughout the whole arc of motion.

At the same time assiduous massage of the shoulder muscles should be practised, but direct manipulation of the bursa, if at all tender, is inadvisable. If the patient has to be up and about, and has to resort to a sling for support, we should be scrupulously careful to remove such twice daily and perform the essential passive exercises.

If the case prove obstinate, and pain radiating down the forearm be a feature, then we should note any *sagging* or *drooping* on the part of the affected shoulder, as we have before emphasized our belief that the brachialgia characterizing these cases is largely due to this postural defect.

Goldthwait, who attaches great etiological importance to this mechanical factor, rightly advocates placing of the shoulder in a position of full extension, so that the scapula rests upon the ribs at the back.

This restitution of the shoulder to its normal position can be achieved either by means of adhesive plaster or a shoulder brace.

Treatment of Adhesions.

These may be dealt with either by a process of slow stretching or by forcible rupture of the fibrous bands under an anæsthetic. After rupture of the adhesions under an anæsthetic has been performed, we have ourselves, in order to prevent the arm falling into its old position of abduction and internal rotation, attached the wrist of the same side, by means of a bandage, to the head of the bed. By this device the raw surfaces at the site of rupture are kept apart, whereas otherwise, on their coming again into apposition, the adhesions are re-formed.

This procedure, however, is very irksome to the patient, as well as the similar one of securing the wrist of the affected arm directly behind the head.

Codman, on the other hand, after rupturing the adhesions, immediately fixes the arm in what is much more convenient—an abduction splint—but this only for twenty-four hours. At the end of this period the bandage securing the arm to the splint is removed, but not the trunk binder by means of which the splint is still retained *in situ.*

The arm, which is now free, can be fully elevated and abducted, and placed behind the head, this manœuvre being repeated twice daily.

Codman follows this plan for a week, only bandaging the arm to the splint at night. In the second week after rupture the splint is only worn for an hour a day, and he speaks most highly of the results obtained by this method.

In conclusion, in regard of these cases of adherent bursa one thing is certain, that, whether we adopt gradual stretching or sudden rupture, we must be prepared to devote tireless attention to the performance of the passive movements essential for complete restoration of mobility.

For, in common with others, we must admit that even after forcible rupture, the adhesions sometimes re-form, and this after

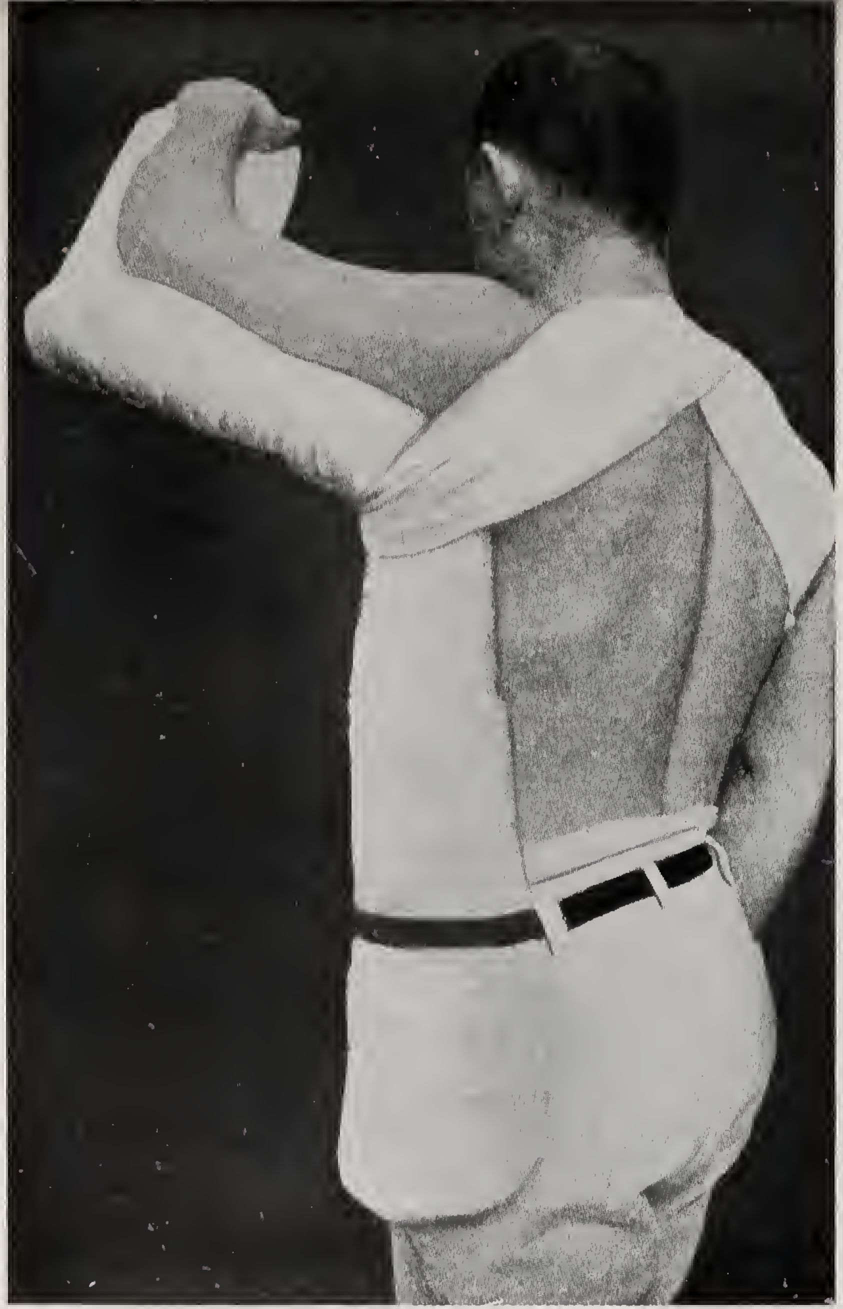


Fig. 109.—Showing abduction splint in position, the patient standing. It is held by a figure-of-eight bandage crossing behind the shoulder and a belt about the hips. The arm is at rest.

Reproduced from "Boston Surgical and Medical Journal," by kind permission of Dr. Codman.

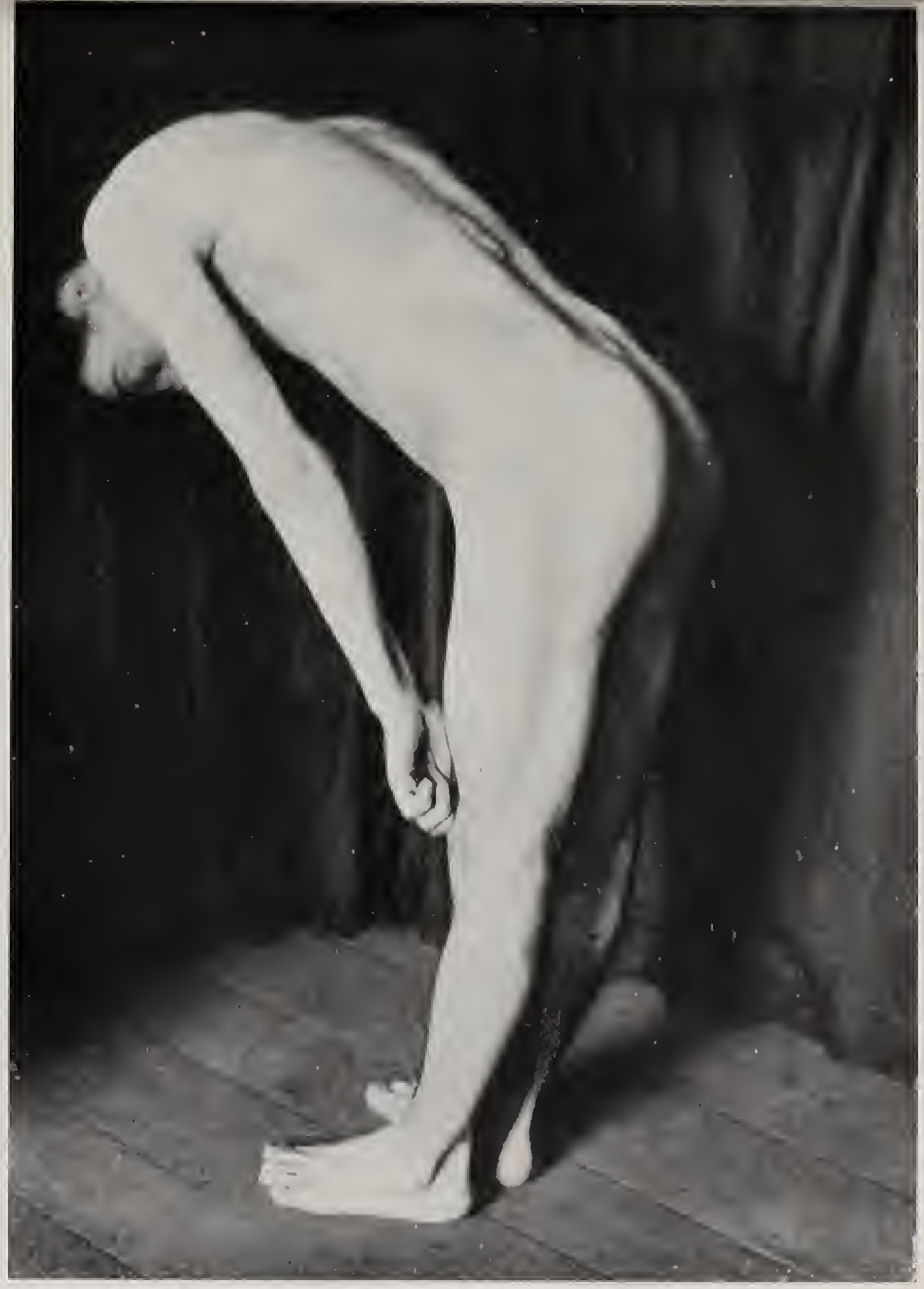


Fig. 110.—Tuberculous caries of lumbar spine. Note restriction of forward movement and lack of normal salient projection of lumbar spinous processes on forward flexion.

To face page 574.

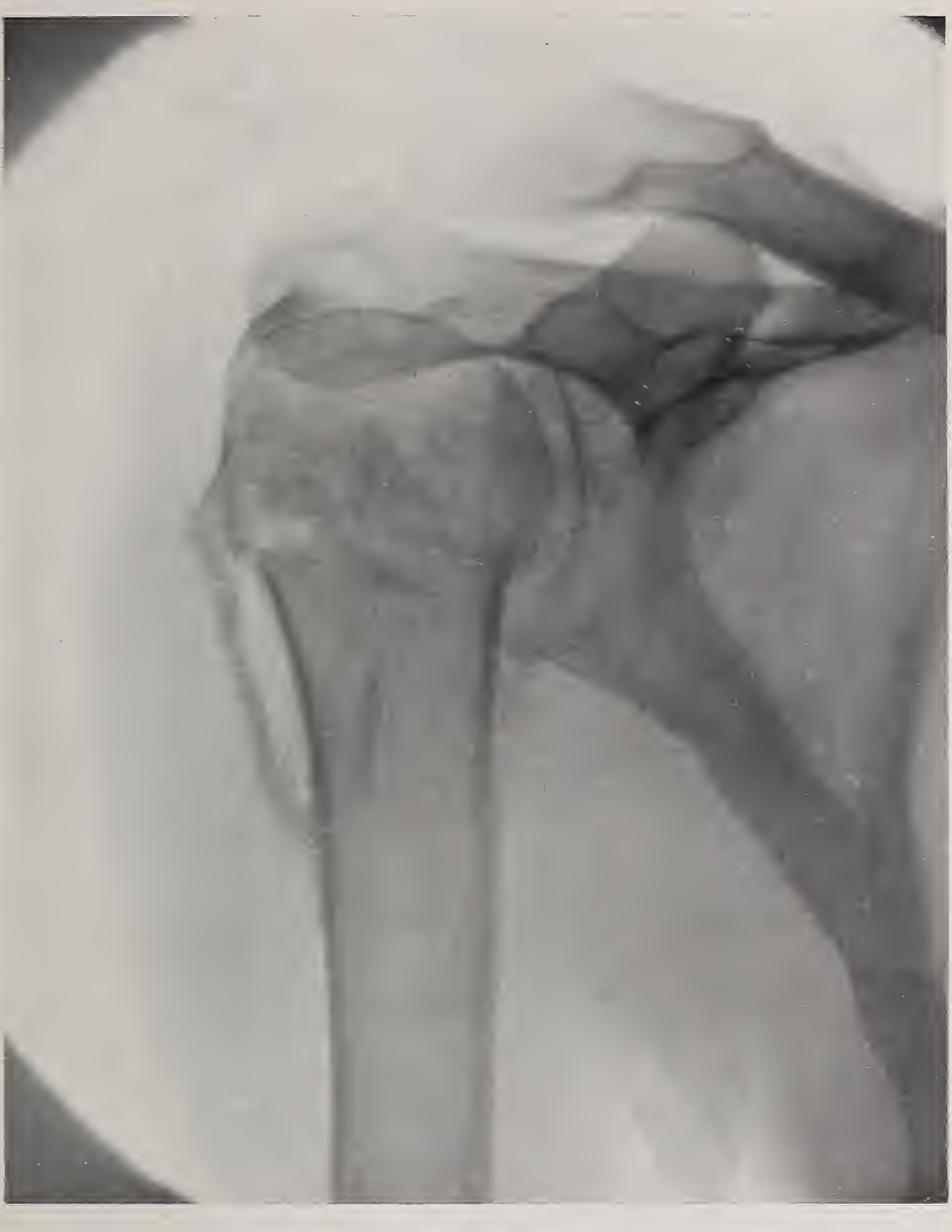


FIG. 111.—Skiagram of painful and stiff shoulder, wrongly attributed to fibrous ankylosis. Forcible manipulation resulted in fracture. The true condition was one of traumatic osteo-arthritis.

a period of some weeks—an untoward occurrence which emphasizes the need for incessant care.

The fortitude demanded of the patient, and the attention required of the physician, seem to have convinced Codman that surgical intervention might with advantage be resorted to more often in the severer examples.

As an alternative to incision of the bursa with division of adhesions, he advocates *excision* of its subdeltoid portion.

In regard of the latter, we have, in a case under our care, seen the happiest results follow the removal of a much-thickened subacromial bursa, which remained defiant to all other methods of treatment.

The encouraging results of Codman's work may be gathered from his appended opinion of the advantages of surgical intervention in some of these cases. Thus he says: "I believe that, with improved knowledge and technique, confidence in the efficiency of this simple operation will become more general, and the surgeon will be willing to urge operation rather than consent to do it."

Subcoracoid Type.

The principles of treatment to be followed in this variety are practically identical.

In the *acute stages*, pending the decline of the inflammatory process, rest is indicated.

Goldthwait lays great stress on restitution of the shoulder if there be any sagging present. This in early stages is productive of great relief, but obviously only if adhesions have not already formed. For in the latter event the pain will be aggravated, as the process of forcing the shoulder back necessarily entails traction upon the bands.

Treatment of Adhesions.—If such have formed, they must be broken down under an anæsthetic, and during the necessary manipulation it must be borne in mind that *rotation* is the movement chiefly compromised.

Flexion and extension of the shoulder should first be performed. Then the arm should be abducted and raised to its highest level, and while in this position outwardly rotated. Lastly, the arm, being depressed, should be rotated inwards and outwards, and in this way perfect mobility throughout the whole arc of movement is assured.

The order of performing the movements should be strictly observed, as through neglect of this precaution we have ourselves seen a fracture of the humerus result, and Goldthwait also, out of his own experience, records an instance of the same casualty.

Subsequently to the rupture of adhesions, their re-formation will be obviated if the shoulder be braced upwards and backwards by means of strapping, or, as Goldthwait advocates, a shoulder brace; and failing this, pressure by sandbags may be invoked to keep the shoulder back.

The *after-treatment* of this condition is precisely similar in all essentials to that advocated in subacromial bursitis.

Treatment of Bursitis of the Lower Limb.

In *subgluteal bursitis* the greatest care must be taken to exclude tuberculous and syphilitic disease, but failing evidences of such, and a clear history of *trauma* being obtainable, the chief indication is *rest.*

This may be attained by confinement to bed, when the patient instinctively lies on the opposite and unaffected side, but if he be up and about crutches are necessary.

In the acute stages, when pain is severe, well-applied hot fomentations combined with analgesic remedies are indicated, while, of course, a close lookout for any evidences of suppuration is essential, which if present will of necessity demand incision.

Should the case prove obstinate and thickening be left, massage and inunction of iodine preparations will usually be found the most effectual means of dissipating the organized inflammatory products, while, as a last resort, excision of the enlarged and thickened bursa may be called for.

Similar principles will guide our treatment of the *ilio-psoatic type of bursitis,* and here it is, if anything, even more necessary than in the subgluteal type to be alive to the possibility of suppuration in the hip-joint, and confusion of the bursal disorder therewith, with consequent belated resort to the necessary operative intervention.

In *prepatellar bursitis* the indications are rest in extension on a back or ham splint, with firm bandaging or strapping, as the pressure thus exerted will mitigate pain and promote absorption of the inflammatory exudate, and only in the case of suppuration or residual chronic thickening will it be necessary to resort to incision or excision respectively.

In *post-calcaneal bursitis,* where this, as is commonly the case, is referable to the wearing of too tight or improper footgear, the prime indication is to procure stillness for the parts and freedom from pressure.

In the milder cases, rest in bed, with local applications, will subdue the more acute symptoms, and if the case prove obstinate and liable to recurrence, it is advisable to slit up the back of the boot, while a loose piece of soft leather is inserted to obviate or minimize pressure on the irritable or inflamed bursa.

Only very rarely will there be any necessity of resorting to the extreme measure of placing the leg, with the foot at right angles, in a fixation bandage until the irritability of the bursa has been allayed.

CHAPTER XXXVIII

TRAUMATIC MUSCULAR FIBROSITIS

Strain or Rupture of Muscles.

SUCH lesions may be the outcome of direct injury, but more commonly they result from sudden violent tension thrown upon the fibro-muscular or tendinous structures, especially the latter. The severity or extent of the damage sustained varies from mere stretching up to partial or even complete rupture, and such may be the outcome of active contraction or passive extension of the particular muscle.

Clinically, its occurrence is evidenced by immediate acute pain and loss of power, and later, if the implicated muscle be superficial, swelling and ecchymosis appear.

Pathologically we may assume that the organic injury suffered by the textures leads to extravasation, and induces secondarily an inflammatory process at the site of the lesion.

The plastic exudate poured out ultimately undergoes organization into fibrous tissue, and though some attempt at regeneration of the muscle fibres may occur, it is rarely complete.

The localized fibrous hyperplasias, which thus develop as the result of rupture of muscular fibres, avulsion of their tendons, or slight tears of their sheaths or aponeuroses, are indistinguishable histologically from those typical of "chronic rheumatism."

Nor does the resemblance stop here, for, clinically, how often do we find it difficult, if not impossible, to decide whether any given case of, for example, deltoid fibrositis is of "constitutional" or "traumatic" origin!

For under the influence of any of the exciting causes of fibrositis swelling of such fibrous overgrowths invariably ensues, and so gives rise to aching and stiffness.

The explanation doubtless is that, the pathological end product—a fibrous hyperplasia—being identical in both constitutional and traumatic forms of fibrositis, the nodules or infiltrations, when established, are prone to respond to the same excitants.

Indeed, all the phenomena of "chronic rheumatism" are reproduced with such fidelity that, in the absence of any history of trauma, their clinical differentiation is impossible.

With this brief prelude we must now pass on to consider the various types of "rheumatic" fibrositis as they occur in the upper limb.

Muscles of Upper Extremity.

Scapulo-Humeral Group.—These muscles are particularly liable to injury through direct blows, twists, or wrenches. Most commonly it is the *deltoid* whose fibres are stretched or lacerated, the so-called "cricket shoulder," but in others the tendons of the supraspinatus or the long head of the biceps may sustain the brunt.

The immediate symptoms are, of course, acute pain at the site of the lesion, with later swelling, and maybe ecchymosis, but often such objective signs are absent. The pain is aggravated by any attempt to bring into action the disabled muscle, which is therefore voluntarily immobilized.

In mild cases properly handled, the pain and stiffness soon subside, and power is gradually regained. But if new fibrous formations develop later at the seat of the lesion, a renewal of aching and stiffness is common, and is but too frequently erroneously ascribed to "rheumatism." Such *nodules* are often situated near the insertion of the deltoid, and may be detected by palpation.

It seems to us probable that the frequency with which deltoid rheumatism is met with in gymnasts, labourers, and so forth, is, as Stockman says, attributable to the irritation set up by these localized fibrous hyperplasias, legacies, as it were, of repeated slight traumatisms.

In less favourable cases, through too prolonged immobilization, more or less wasting of the deltoid ensues, and *adhesions* are formed between it and the subjacent bursal or periarticular structures. The existence of such fibrous bands may be inferred when—though spontaneous suffering has ceased—sudden pain, often of sickening character, is evoked, if attempts are made to move the arm in certain directions. Thus the antero-posterior movements of flexion and extension are usually free, but those of *abduction without rotation* are limited, the degree of restriction varying with the extent of the adhesions.

In cases where the *supraspinatus* tendon has been torn or strained, there is a special tendency to involvement of the subacromial bursa, with limitation especially of abduction.

When adhesions exist between the *long head of the biceps* and its sheath, acute pain is felt in front of the shoulder on bringing this muscle into action.

Apart from the pain induced by certain movements, these subjects often complain that it is worse at night, a peculiarity which favours its confusion with "rheumatism." This nocturnal exacerbation is due to the fact that during sleep muscular relaxation occurs, and the adhesions are then dragged upon. The limitation of movement in these cases may be considerably masked if care be not taken to fix the scapula when conducting an examination.

Elbow Muscles.—Strain or slight tearing of muscles in this region may occur through functional overaction or faulty exercise. It occurs so frequently in tennis-players that the term "tennis elbow" seems now to have obtained a settled place in nomenclature. Albeit, it is by no means confined to devotees of this particular pastime, for it may follow fly-fishing with a heavy rod, not to mention its frequency in overworked seamstresses, ironers, locksmiths, or hammermen.

In tennis it seems to follow overplay and strain, especially back-handed strokes, in which the forearm is held fixed in a position midway between pronation and supination. It seems less likely to happen when the strokes are played through from the shoulder, and not from the elbow. But in others, who have no predilection for back-handed play, the jar or strain to the elbow seems to occur when meeting fast balls with the supinated forearm.

Hammermen or wheel-tappers, too, when alternately flexing and extending the elbow with the forearm supinated, are liable to similar strain.

The onset of the affection may be immediate or delayed for some hours. It is signalized by pain, which may be intense, and even temporarily disabling. It is commonly referred to the front and outer side of the joint, and frequently radiates down the forearm. It may be constant, or only produced by movements entailing strain on the damaged structures. There is usually marked tenderness at the seat of injury, and in our experience this is often situated over the *radio-humeral* joint, which sometimes shows signs of apparent effusion. In other instances, however, it is referred more definitely to the *external epicondyle*, whence the term "epicondylitis" or "epicondylalgia."

The range of elbow movement is not restricted, and the salient characteristic of the affection is the intense pain that ensues on *forced extension of the forearm in supination.*

Many views have been advanced as to the nature of this affection, but it is probable that the differences of opinion that obtain are in reality due to the fact that the site of the lesion varies in individual instances. Thus, having regard to the fact that the pain in some instances is referred, not to the outer, but to the inner, side of the joint, it has been suggested that the affection is one of chronic synovitis, with strain of the internal lateral ligament.

The more common hypothesis, however, is that it is due to laceration, and even actual avulsion, of the muscular bundles attached to the external condyle, and in two inveterate cases of this nature skiagraphed by Dr. Coues, small bits of bone seem to have been torn away from the external condyle.

Personally we are inclined to believe that in some instances the pain and disability are due to stretching or slight tears of the supinator brevis and brachialis anticus, which send some fibres to the capsule of the radio-humeral joint.

Forearm Muscles.—Strain or rupture of these may occur through a direct blow, and more commonly the lesion is situated in the extensors or the supinator longus muscle. But, apart from this, we believe that constant *overaction* of the extensor muscles may ultimately produce similar, though less recognizable, changes.

In the former, or definitely traumatic types, the injury to the muscles savours of an assault; in the latter it is of the nature of a summation of petty insults or strains.

We have ourselves found *nodules* in the muscles of the forearms and the hand in the subjects of writer's cramp. They are more commonly located in those muscles that arise from the *external* condyle and less so in the flexors and pronator radii teres.

One is led to the conclusion, therefore, that in some of these instances minute tears or strains lead gradually to the formation of *localized fibrous hyperplasias.*

The excessive demands upon the muscular structures must inevitably irritate their periosteal attachments, give rise to low-grade inflammatory changes in the sheaths of the tendons, and possibly in the fibrous elements of the muscles themselves.

Thus, pianists, violinists, typists, telegraphists, and the like frequently complain, as we know, of pain and aching in the upper extremity. Zabludowski, who has paid much attention to the myalgia of pianists and violinists. attributes their pain to slight sprains, to tenosynovitis without noticeable effusion, or to myositis. The determining factor appears to be a *mechanical* one: either that the keys of the piano are too widespread for the subject's hand, or that the compositions practised are those in which the hand undergoes overstretching through excessive execution of octave and arpeggio movements. The same trouble is experienced by violinists continually practising pieces which involve difficult intervals, and therefore overstretching.

Lorenz, who holds similar views, states that an actual neuritis may be initiated by such overstraining of particular groups of muscles, and that the associated reflex muscular spasms—though of organic origin—may simulate closely genuine functional "craft neuroses."

They, however, differ from these in that they are usually traceable to some *localized lesion*, maybe of *periostitis*, *tenosynovitis*, *or myositis*, whose quick response to treatment by rest of the affected muscles and altered mechanical conditions of work sufficiently attest their essential difference from true "craft neuroses."

Muscles of the Lower Extremity.

Glutei.—Contusions through blows or falls upon the buttock may be followed by more or less hæmorrhage into the muscles, and, according to the severity of the lesion, may occasion more or less disablement. For when the immediate effects of the injury have passed away, the muscles and fasciæ, as well as the subcutaneous tissue, may be found diffusely infiltrated.

Such an untoward result is all the more likely to occur in cases in which early massage has not been adopted. When thus neglected, the *chronic interstitial myositis* which results leads to extensive induration of the muscle substance, while, apart from this, adhesions to the surrounding parts are only too likely to occur.

In some instances, especially women who have landed heavily on the buttocks through slipping on a polished floor, or who have been thrown while hunting, the muscles and fasciæ attached to the coccyx may be stretched or torn, and so bring about that troublesome condition known as *coccygodynia*.

Adductor Muscles.—These muscles, especially the long adductor, very commonly in horsemen sustain partial or complete rupture, whence the term "rider's sprain."

What happens usually is that the horse, either on the flat or in taking a fence, shies or swerves in his stride to one or other side. His rider, taken by surprise, fails to follow the lateral movement, say to the left, and, fearing a fall to the right, makes a desperate effort, by means of his left adductors, to retain his seat.

The rupture may occur at the pubic insertions, or lower down in the body of the muscle or muscles. The local pain experienced is usually very severe, and may radiate to the anus, while any attempt at gripping the saddle is impossible by reason of the intense suffering induced.

In bad cases with a breach of continuity, there may be considerable separation between the divided portions, appreciable by palpation, and of course accompanied by loss of power. Swelling swiftly occurs, and in two or three days ecchymosis, extending over the thigh, and even to the perineum, may show itself.

In former days, before early massage was resorted to in these cases, various forms of apparatus were in use to prevent recurrence. As a rule they proved futile, and if riding exercise was persisted in repetition of the casualty almost invariably occurred, and ultimately contraction and wasting of the adductors ensued.

Quadriceps Extensor.—Rupture of the fibres of this muscle is not uncommon in athletes. It presents no special features beyond the fact that, as a sequel, adhesions may form between the ruptured aponeurosis and the patella or its ligament.

In this event, though free extension of the knee is possible, flexion is limited until the opposing bands have been broken down, and the muscle thus released.

Gastrocnemius.—Strain or rupture of the fibres of this muscle is common in tennis-players, and in some instances the tendo Achillis is partially or completely torn.

The lesion most commonly is situated in one or other belly of the gastrocnemius, and a distinct sulcus may be felt. In other instances it appears to be localized in the plantaris or the soleus.

The sudden tear gives rise to a sensation as if the calf were sharply struck with a stick. Considerable ecchymosis may appear in a few days. The patient at the time walks with a limp, and eventually in neglected cases the heel may be drawn up, and full dorsiflexion of the ankle may be impossible.

Muscles of Trunk.

These constitute a most important class, and the lesions may be situated either in the abdominal muscles or those of the loin, so called " traumatic lumbago."

Abdominal Muscles.—Strain or slight lacerations not infrequently occur in the *oblique* muscles, especially the external at its costal origin near the twelfth rib.

The casualty known among athletes as " bowler's side " is of this nature, but it is not uncommon also in women, either as the result of overreaching or slipping.

Immediate and exquisite pain is experienced at the site of the lesion, with tenderness and later slight swelling. It is aggravated by deep inspiration or movement.

The pubic insertion of the recti is also sometimes the seat of a similar lesion. The story forthcoming usually is that the mishap occurred during a violent effort to escape falling backwards through a slip. Something is felt to give way, and excessive pain is experienced when any attempt is made to rise from the recumbent posture.

At the site of the lesion there is tenderness to palpation, and it may be possible to appreciate a gap between the divided ends. While the rupture usually occurs either in the lower half of the rectus or near its insertion into the pubes, it sometimes gives way near its upper attachment to the ribs. At the former site the integrity of the inguinal canal may be impaired, and *hernia* may develop. More commonly all that results is that a perceptible *induration* may form at the seat of the injury, the presence of which the patient may for a long time be conscious of on extra exertion.

Lumbar Muscles.—Lesions of this group constitute the commonest and perhaps the most important variety of traumatic muscular fibrositis, the so-called " traumatic lumbago," and to a detailed consideration of this, by far the most important type of traumatic fibrositis, we devote the following chapter, but meanwhile it will be convenient here to interpose the treatment of the varieties just considered.

Treatment.

The principles of treatment are precisely similar to those generally adopted for all injuries. They consist in—(1) Relief of pain; (2) absorption and dissipation of inflammatory products; (3) restoration of functional efficiency.

A great deal has been recently written on the treatment of slight tears or ruptures of muscular and tendinous structures, but in effect it may all be summed up in Dr. Wharton Hood's aphorism—" Rub and strap."

Lesions of the Upper Extremity.

Tennis Elbow.—If seen during the acute phase, the arm in the first place should be *elevated* for some minutes, so as to empty the limb as far as possible of blood, and thus relieve tension.

Coincidently, *light effleurage*, with circular movements over the affected area, should be performed, and the most sensitive spots only delicately pressed upon at first. Subsequently the forearm, with the muscles in a state of complete relaxation, should be strapped from 4 inches below up to the level of the elbow-joint. To permit of flexion of elbow, a small portion should be cut out from the strip of plaster nearest the elbow-joint. The patient should then be encouraged to use his arm.

The strapping will have to be renewed from time to time, and advantage should be taken on such occasions for the performance of *massage and passive movements*. This should be continued as long as there is pain and tenderness, while it must not be forgotten that, if relinquished too soon, the formation of *localized fibrous hyperplasias* near the insertion of the implicated muscles is almost certain to occur, and in this way aching and stiffness will accrue on the slightest pretext.

Neglected cases may prove extraordinarily obstinate, and in one case recently under our care, of over twelve months' duration, *hot douching combined with massage* eventually produced lasting relief.

The principles of treatment of other lesions in the upper extremity are substantially the same—support to the affected muscles, their continued use, and massage.

Lesions of the Lower Extremity.

Tennis Leg.—When confronted with acute cases, the limb should be raised, and, the foot resting on the end of the couch, the calf should be skilfully effleuraged for some minutes.

Pain, tension, and swelling being thus relieved, strips of plaster overlapping each other should be applied from a little above the ankle upwards beyond the swell of the calf.

As one of us from personal experience can testify, firm bandaging is equally efficient, and often more convenient. In either case, if the necessary support is to be maintained, frequent renewal of the strapping or bandaging is requisite, and before the reapplication *massage* enlisted.

Always, after applying the plaster in the first instance, it is well to impress upon the patient the importance of placing the heel fairly and squarely on the ground, and it is advisable for oneself to see that, when walking, he actually does so.

By so doing we avoid the pitfall incidental to the old plan of prolonged rest with raising of the heel, as this invariably led to union of the torn fibres, with shortening. What happens, then, when the acute stage has subsided, is that the fibres are again liable to give way, if in some sudden movement the muscles are fully or forcibly extended.

To resume, walking should be counselled, and strapping or bandaging continued, until all pain and tenderness have disappeared.

The calf muscles, it should be remembered, are common sites for muscle indurations, and premature abandonment of the massage favours their formation.

Rider's Sprain.—In this, one of the commonest and most troublesome forms of traumatic fibrositis, the same principles must guide us.

In severe types with massive effusion, undoubtedly rest in bed for the first three days is advisable. Meanwhile, from the onset *massage* should be practised, but with reasonable gentleness.

After this period the parts should be encircled with strips of plaster from below upwards, and the patient should resume walking, which as a rule will be painless unless active attempts at adduction are made, or by some mischance his limb slips in the position of abduction.

There is no objection to his taking horse exercise, but it is just as well for him to shorten his stirrups so as to avoid sinking too deeply into the saddle, and thereby stretching unduly the injured parts.

Taking a fence had best be postponed, and, if possible, a shying horse avoided, till the parts are thoroughly healed.

Always, when jumping is resumed, a certain amount of uneasiness is felt, but this must be put up with, as it will eventually disappear.

The same care should be taken to renew the strapping when loose, and to persevere with massage and passive movements, so as to avoid *atrophy and contracture of the adductors*, which are likely to occur.

The later the case is seen after the injury, the more prolonged will be the massage required before an active life is resumed.

Lesions of Gluteal and Quadriceps Muscles.—In contusions or strains of the glutei, if neglected, extensive indurations of the parts may ensue, and weeks or even months of massage may be required to dissipate the infiltrations.

Because, moreover, of the *secondary sciatic pain* which may ensue, these cases prove extraordinarily troublesome—a clear indication for early resort to massage.

In lesions of the quadriceps muscle rubbing, strapping, and passive movements should be practised assiduously, as there is a tendency to the formation of adhesions between the quadriceps and the fibrous tissues in the neighbourhood of the patella.

Consequently, during passive movements care should be taken to insure *full flexion*, so as to obviate the necessity of breaking down adhesions later on.

In regard of *bowler's side*, *rupture of the recti*, and other lesions of abdominal muscles, all that need be said is that the same plan of rubbing and strapping, combined with passive movements, should be followed.

Lastly, in any of the foregoing lesions, where a complete breach in the continuity of a muscle has occurred, an operation should be undertaken for *suture of the divided ends*, with at a later date massage, passive movements, and exercises, to obviate the formation of adhesions.

CHAPTER XXXIX

TRAUMATIC LUMBAGO

Synonym: Traumatic lumbar fibrositis.

It may safely be said that, of all types of traumatic fibrositis, this particular variety is at once the most common and the most productive of lasting disability.

The great mobility of the lumbar spine doubtless accounts for the frequency with which this region suffers from strain or injury, while the intrinsic complexity of the structures involved renders treatment difficult, and but too often unsatisfactory.

By common consent our views as to the nature of the affection are sadly lacking in precision, and up to the present time the condition has not been correlated with any definite anatomical lesion.

Most writers, indeed, content themselves with classing under this elastic term *all instances of lumbar or lumbo-sacral pain which, though directly attributable to trauma, are yet lacking in those graver phenomena which mark severe spinal injuries.*

Up to the advent of skiagraphy, no more exact definition could be formulated, but it would not be too much to say that its disclosures have revolutionized our previous conceptions of traumatic lumbago. For we now know that not infrequently actual bony lesions are present in instances where nothing more serious than a strain or tear of muscular or fibrous tissues was suspected. This draws us infinitely nearer to a pathological interpretation of the term " traumatic lumbago," for from the results of skiagraphy we can at any rate differentiate between purely muscular types and those graver forms marked by osseous change.

How severe may be the organic damage sustained by the lumbar column and its processes, and this in cases wholly lacking symptoms of cord involvement, will be gathered from the ensuing section.

Etiology.

The casualties responsible for traumatic lumbago are of most varied nature, and, broadly speaking, may be of extrinsic or intrinsic origin.

In regard of *extraneous* injury, it is generally *indirect*, the lumbar column through its great mobility suffering secondarily to some violence received by the upper or lower end of the spinal column.

Thus, for example, a man falls or is pitched while hunting or cycling on to his head or shoulders, and his spine is thereby forcibly doubled up—in other words, it undergoes sudden *acute flexion.*

Or the same result may be brought about by a heavy weight falling on his bowed shoulders: a loaded sack or a sudden subsidence of coal or débris—a mishap very common among miners.

That the effects of such indirect injury are so commonly localized to the lumbar spine is, of course, due to the mobility of these segments, which renders them especially liable to sprains.

The common lesion produced by such forcible flexion forwards of the column is *strain or laceration of the posterior spinal muscles or ligaments.*

Incidentally, too, it should be borne in mind that, when the spine is forcibly bent forwards, the kidney lies in the angle of the bend—viz., at the spot where the flexion of the column is the most acute.

This accounts for the frequency with which *hæmaturia* follows extreme bending of the spine, owing to the kidney being squeezed between the ilium and the lower ribs.

Still more severe injuries, however, may follow such forcible flexion. Thus, the sudden impact of a heavy weight on the shoulders, if the supporting muscles of the column are off guard, falls dead on the spinal column, and, as recent researches have shown, a *compression fracture of the fifth lumbar vertebra* may result.

Lastly, too, we should recollect that fracture dislocation is more commonly produced by indirect than direct violence.

Frequently, however, the concussion or jar is received by the *lower* end of the column—viz., the man falls from a height on to his buttocks or ischial tuberosities. The most common lesion that results in such a casualty is a strain or slight laceration of the sacro-iliac ligaments on one or both sides, these synchondroses being the weakest spots of the pelvic girdle.

Apart from the foregoing indirect injuries, the lumbar or sacral regions are very exposed to *direct* violence—viz., a kick, or a fall from a height on to a scaffolding pole or a heap of stones, etc. The injury will vary according to the nature of the accident. Thus, if the lumbar column through a fall come into violent contact with a bar or pole, the spine undergoes *overextension* as opposed to flexion, and consequently *strain or tearing of the psoas or anterior spinal ligaments* may ensue.

If, on the other hand, the victim lands on a projecting corner or stone, so that the blow received was very defined and localized, *fractures of the laminæ or spinous processes* are more likely to occur. If the sacrum, however, sustained the impact, the *sacro-iliac or sacro-coccygeal ligaments* may suffer strain or rupture, and not uncommonly these same structures give way when the pelvis is squeezed laterally from side to side.

In all the foregoing instances of *extrinsic* origin, if a clear and veracious history be forthcoming, the injury received can be satisfactorily accounted for.

In traumatic lumbago of *intrinsic* origin, the *modus operandi* of the alleged casualty is less obvious, and only to be gleaned from a careful reconstruction of all the details of the accident.

Very commonly the story forthcoming is that, while carrying or attempting to push, shift, or raise a heavy weight, the subject was seized suddenly with excruciating pain in the lumbar or lumbo-sacral region, and very frequently a sensation is felt as if something had given way or been displaced. The commonest lesion in such event is *strain or rupture of the lumbar or gluteal muscles*, and in the more severe cases a similar injury to the *posterior spinal or sacro-iliac ligaments*.

In other instances the subject is not in a crouching or bent position, but, while walking, suddenly slips backwards, and in an endeavour to recover his balance his psoas muscles or anterior spinal ligaments suffer strain or a slight tear.

Occasionally there is a distinct history of a wrench or torsion of the lumbar column, and it is in such cases that injury to the *lateral or apophyseal articulations* is more likely to ensue.

We have entered into such detail on the etiology, for oftentimes careful physical examination fails to reveal any anatomical basis for the pain and inability to move. It is highly necessary, therefore, that all the circumstances of the alleged injury should be carefully weighed, if we would formulate a well-considered opinion as to the actual nature and site of the local lesion produced.

Anatomical Lesions.

These may predominantly implicate the muscular, ligamentary, articular, or osseous elements.

Muscles.—The muscular or aponeurotic layers of the loin are the structures that are most commonly damaged. The strain or rupture is usually localized near the tendinous attachments of the lumbar muscles to the iliac crest and sacrum; but occasionally the substance of the latissimus dorsi or the erector spinæ is partially, or in rare instances completely, severed.

In by far the greater number of instances, however, only the fibrous elements of the fascial planes undergo stretching or strain.

Ligaments.—The anterior or posterior spinal ligaments of the lumbar column are more prone than those elsewhere to undergo strain or rupture.

Usually the lesion is situated in the *posterior* ligaments, the anterior being involved only very exceptionally. Much more frequently than in the spinal group of ligaments do we meet with laceration or stretching of the *sacro-iliac* ligaments on one or other side, the lesion often leading to more or less permanent relaxation and preternatural mobility of the affected synchondroses.

Intervertebral Joints.—These joints are no more immune from the effects of strain than other articulations more superficially situated.

Judging from the clinical phenomena of some forms of traumatic lumbago, the trouble is located in these joints, whose ligaments and capsules have undergone slight tears through wrenches or torsion of the column.

Osseous Lesions—Fracture of the Transverse Processes.—Dohan, out of a series of twenty-five cases of "chronic lumbago" subjected by him to skiagraphy, found in two cases fracture of two or three transverse processes, and in two a fracture of the sacrum. Moreover, apart from this, in every individual of the series he detected distinct alterations in the intervertebral joints—viz., in some a high-grade atrophy of the bony process, in others exostoses and ossification of the longitudinal ligaments.

Tanton also has noted the frequency with which the same lesion, uncomplicated by more extensive vertebral damage, has hitherto passed unrecognized as a cause of "chronic lumbago."

The fractures, he states, may be single, but are usually multiple, and the transverse processes of the second, third, and fourth lumbar vertebræ are those most frequently implicated. Generally they are attributable to direct violence, but, according to Tanton, they sometimes result from *pure muscular contraction.*

Fracture of the Fifth Lumbar Vertebra.—Quite recently Feinen has drawn attention to the fact that such may be caused, not only by direct trauma, but, *mirabile dictu*, even by *unusual efforts to raise heavy objects.*

Out of nine subjects of "chronic lumbago," in no less than six radiography revealed a compression fracture of this segment, the fourth vertebra being usually displaced forwards a little and rotated slightly on its vertical axis.

In attempting to explain the constant localization to this particular segment, Feinen remarks that it is the *fifth* vertebra that bears the brunt of all the strain, and, moreover, that, anatomically speaking, it is less efficiently equipped for this purpose than the other segments of the lumbar column; for all the other lumbar vertebræ possess on both sides the elastic support of the adjacent segments and intervening discs, while the inferior surface of the fifth is firmly fixed to the unyielding sacrum.

In the light of these findings we see that our conception of traumatic lumbago must be correspondingly enlarged, for it may safely be said that we have hitherto imperfectly realized the variety as well as the gravity of the lesions which may underlie any given case of this disorder.

Clinical Account.

While a certain general resemblance characterizes the symptomatology of these traumatic types of lumbago, still, individual examples display special features, varying with the nature of the structures predominantly involved.

We shall in the first instance deal with the affection when due to strain or rupture of muscles and fasciæ, and subsequently with the graver forms due to ligamentary or osseous lesions.

Strain or Rupture of Muscles.

The onset is fulminantly sudden, the patient being seized with excruciating pain in the lumbar or lumbo-sacral region.

So intense and disabling is the suffering that it immediately incapacitates the victim for further muscular effort, and usually for the time being he is practically placed *hors de combat.*

Only in the milder cases, after a brief interval of rest, is the subject able to resume work, but of a less arduous nature.

Site of Pain.—As a rule it is strictly localized to the seat of injury. The constancy with which it remains fixed to one and the same spot is most characteristic. If pain similar to that experienced in the lumbar or lumbo-sacral region is subsequently felt elsewhere, even in other parts of the loin, the probability is that we are dealing with a case of " rheumatic," and not " traumatic," lumbago. The pain in " traumatic " lumbago is nearly always, if not invariably, *unilateral.* If experienced on both sides of the vertebral column, it is almost certainly " rheumatic." Similarly, even if it be unilateral, but radiates also to the leg on the same side, it is much more likely to be "rheumatic" than "traumatic."

Whether the injury be situated in the muscle, its tendinous attachments, or dorsal fasciæ, the pain is aggravated by any movement causing an increase of tension, and *vice versa* relieved by relaxation of the damaged structures. It is in those instances where the rupture of a muscle is *partial* that most pain is experienced on contraction or extension of the affected muscle.

For in partial or incomplete rupture there is still continuity with fixed attachments, and so indifferently—either through volitional contraction of the affected muscle or its antagonists—an increase of tension with associated pain results. Obviously, in instances of *complete* division no increase of tension follows voluntary contraction or extension of the muscle through the pull of its opponents, which simply results in a widening of the gap between its torn ends.

This is, of course, only true of the case in its earlier stages, for when, later on, the divided ends become moored by *adhesions*, pain, of course, follows contraction or extension of its substance.

Muscular Disabilities.—With the pain there is associated relative or absolute functional impotence on the part of the particular muscle affected.

In strain or incomplete rupture its use is painful and restricted to a greater or less degree. Where a complete breach of continuity of the muscle substance occurs, the movement subserved by it is completely lost.

Careful noting of the particular disability incurred is essential for accurate identification of the injured muscle.

Thus, when the *latissimus dorsi* is at fault, it is either painful or impossible for the patient to depress his raised arm and simultaneously to carry it backwards.

Again, strain or laceration of this muscle leads to great difficulty in maintaining the erect position—hence the pain incurred during standing and walking; for these muscles, when they act together from their origin in the small of the back, extend the upper part of the spine on the lower, and this, with the associated downward movement of the scapulæ, produces a so-called "military carriage."

The assumption of such an erect pose is, of course, painful, or even impossible, when the latissimus dorsi muscle or muscles are injured.

Again, when the *erectores spinæ* are the seat of strain or slight laceration—namely, "labourer's" or "golfer's" back—there will be difficulty in standing and walking; and when one only is affected, there will usually be a list to the injured side. Any endeavour to rise from a stooping posture causes intense suffering, owing to the damaged muscles being thrown into action.

Extreme flexion forwards of the trunk—associated as it is with elongation of the damaged extensors—also gives rise to similar distress.

Again, apart from the pain induced secondarily through the action of their antagonists, the same suffering is evoked by the contraction of their synergic allies. Indeed, this *synergic action of functionally allied muscles* has a very direct bearing on the symptomatology of these definitely "traumatic" types of lumbago, and is largely responsible for the distress experienced.

Thus, in the more severe forms *coughing* and *sneezing* are intensely painful, and the performance of *micturition* or *defæcation* may be so distressing that, not only obstinate constipation, but *retention of urine*, sometimes occurs.

In the same way, any movement that entails displacement of the centre of gravity, and thus involves the muscles of equilibrium, reverberates painfully in the lumbar region. For example, any contraction on the part of the dorsal muscles in order to steady the action of their antagonists, the psoas and lateral abdominal group—as occurs during the act of sitting up in bed—gives rise to exquisite torture from the increased tension thrown on their tendinous attachments to the iliac crest and sacrum.

Objective Signs.—The only constant phenomenon is *tenderness to pressure*, which is present alike in strain, laceration, or complete rupture of the muscular or fibro-muscular structures.

Immediately subsequent to injury the tenderness may be more or less diffuse, but careful palpation will usually elicit a point of maximum sensitiveness over the site of the lesion.

In the more severe instances there may be local evidences of the trauma—*ecchymosis, swelling, and even effusion.* Subsequently, the extravasated blood having undergone absorption, it may be possible in isolated instances to detect a sulcus or furrow traversing the muscle substance. Such a direct breach of continuity sometimes occurs in the latissimus dorsi, but in most instances the density of the enveloping fascia precludes any wide separation of the ruptured portions.

Owing to its inclusion between the layers of the lumbar fascia, lacerations of the erector spinæ are unattended by any external evidence, though pain and tenderness will be experienced at the site of the lesion.

These traumatic cases are, as we have remarked, usually *unilateral*, and among the consequences that may supervene are *wasting and flabbiness of the lumbar muscles* on the affected side, with diminished faradic excitability.

Or, on the other hand, an overgrowth of fibrous tissue may take place, and the muscle substance undergo *focal or diffuse sclerosis*, with permanent disablement, owing to the matting together of the tissues with the formation of adhesions.

In addition, these fibrous hyperplasias give rise to more or less persistent aching and stiffness in the affected muscle, reacting to exposure, damp, and so forth, in precisely the same manner as those organized deposits met with in the various forms of " rheumatic " fibrositis.

Sometimes, too, the adjacent nerves are involved or compressed by such fibrous formations, and so we have superadded neuralgic pain in their area of distribution.

The trunks more commonly involved are the ilio-hypogastric, the last intercostal, or one of the posterior lateral cutaneous branches; and where this *secondary neuralgia* involves the latter nerve, tender points can often be elicited along the margin of the erector spinæ.

Course of Disease.—This is very variable, and is chiefly determined by the severity of the initial lesion. When, as often happens, the muscles or fascial tissues are apparently only overstretched, a month or six weeks will probably cover the duration of the disability. But where actual lacerations occur, with the formation of adhesions or localized fibrous hyperplasias, the tendency to chronicity is very marked.

Traumatic Lumbago due to Ligamentary, Articular, or Osseous Lesions.

Etiologically, the same class of injuries is responsible for these deep-seated lesions, though as a rule greater violence is necessary to evoke them.

Their differentiation is at best a difficult matter, yet great assistance will be derived from a critical consideration of the nature and circumstances of the alleged trauma or accident.

Not only should the attitude of the subject at the time of its occurrence, if possible, be ascertained, but also the character of the surface on which he was standing.

In short, every endeavour should be made to reconstruct the details of the casualty, and in this way to obtain a clue to the probable lines of stress or strain to which the victim was subjected, and upon which anatomical structures the brunt would be most likely to fall.

Injury to Spinal Ligaments.—Strain or rupture of the *anterior* group is very rare, and careful study of the history is of the greatest value in determining the possibility of such a lesion.

The story generally forthcoming is that, in sequence to forcible *hyperextension* of the trunk, immediate and excruciating pain was felt deeply in the back at the site of the injury.

The subject's distress is, of course, greatly aggravated by forcible backward flexion. Owing to the depth and inaccessibility of the parts, there are no external evidences of trauma, nor can local tenderness be elicited.

Strain or rupture of the *posterior spinal ligaments* is far more common, and usually sudden *forcible flexion forwards* of the trunk is usually responsible for its occurrence.

Immediate and severe pain is felt at the site of injury, over which there is exquisite tenderness to palpation. At first all movements involving the implicated segments are intensely painful, and instinctively every effort is made to immobilize this portion of the column.

With the decline of the acute symptoms, movements not involving direct strain upon the damaged tissues admit of achievement, but those in which the ligaments are subjected to stress—viz., extreme forward flexion—remain painful for a prolonged period.

In those rarer instances where *complete rupture* of the posterior ligaments binding two adjacent vertebræ has occurred, the following symptoms are diagnostic: Exquisite pain is felt at the site of injury, which is intensified when standing in the erect position. Moreover, a localized kyphus projects when the patient stands, but disappears when he lies down.

Lastly, in the more severe forms of injury the ligaments actually within the spinal canal may be torn, with resulting hæmorrhage either outside or within the dura mater. Such cases are marked at first by irritative symptoms—*i.e.*, radiating pains from the site of lesion, and later signs of pressure, evidenced by weakness or actual palsy of related muscles.

Lesions of Lateral Vertebral Articulations.—Certain cases of traumatic lumbago seem due to injury of the apophyseal joints, usually only on one side, and generally the outcome of a wrench or twist of the trunk.

The articulations most commonly implicated are those of the *third*, *fourth*, and *fifth lumbar segments*.

Pain and tenderness are immediately experienced over the affected joints, and the distress is markedly intensified by any movement involving extension of the trunk. In his anxiety, therefore, to keep the damaged articular surfaces apart, the subject leans slightly forward and over to the healthy side.

The determination of the exact site of the lesion will be greatly aided by careful palpation.

The patient being asked to indicate the seat of his pain, the fingers should be applied at this level to the lateral margin of the sacro-lumbalis just above the iliac crest. Firm and constant pressure should then be made in the *sagittal* direction—*i.e.*, towards the abdominal cavity. Afterwards, without removing the finger from this spot, one should unobtrusively deflect the pressure directly *inwards* toward the vertebral column. It now should be elicited from the patient whether the *first* or *second* application of pressure gave rise to most pain. If the latter, the *vertebral joints*, in all probability, are the seat of injury.

The vicious attitude automatically adopted to avoid pain may ultimately become impossible of correction, owing to the formation of *adhesions*. Lateral flexion to the healthy side thus remains restricted, or even abolished, and a permanent lumbar scoliosis results.

In old-standing cases thickening of the column at this site commonly develops, and Ludloff asserts that auscultation sometimes reveals the presence of grating in the affected joints.

Injury to Sacro-Iliac Joints.—This may follow direct violence —*i.e.*, a blow or fall upon the sacral region—or it may occur indirectly through a wrench or twist, or while attempting to lift some extraordinary weight.

The onset of pain is immediate, and is sometimes accompanied by a sensation of something having given way. It is often of crippling intensity, negativing any attempt at movement. It is usually unilateral, or at any rate very much worse on one side.

The pain and associated tenderness are at first strictly localized to the site of the joint, and apparently situated in the fibrous tissues or ligaments covering the posterior surface of the articulation. Sometimes, however, it seems to be deep-seated in the articulation itself, and this may be suspected if pain in addition is referred along the sciatic area—a consequence, presumably, of effusion into the joint and pressure upon the sciatic trunk, which passes down in front of the articulation.

With the subsidence of the acute stage recovery often ensues, but in neglected or very severe cases, with rupture of ligaments, the residual symptoms and signs are typical of *relaxation of the sacro-iliac synchondroses*, and, to avoid reiteration, we would refer the reader to a later section dealing with that affection.

Fracture of Transverse Processes.—Tanton, who has dealt more particularly with these lesions, states that pain is practically the sole symptom. Usually it is localized, but occasionally radiates down the sciatic nerve or to the abdominal or coccygeal region. It is especially intensified by forward as well as lateral flexion to the uninjured side. For notes of the following example of this rare casualty we are indebted to Mr. Dunn, the case being under the care of Mr. Robert Jones:

The subject, a man aged fifty-nine, some nine months before coming under observation, fell off a ladder, striking his back on a barrel. As a consequence, he had done no work since the casualty. On examination, stiffness and pain in the lower part of the back on bending were noted. A small hard nodule, tender on pressure, was easily palpable 1½ inches to the left of the fourth lumbar vertebra.

Radiography revealed the shadow of a portion of bone lying on the outer side of the transverse process of the fourth lumbar vertebra. An operation was undertaken, and an osteoma, the size of a walnut, attached by a pedicle to the fourth lumbar transverse process, was removed, and adhesions in the neighbourhood of the spine at the same time broken down.

Compression Fracture of Fifth Lumbar Vertebra.—Despite the severity of the injury, Feinen noted that subjectively the individuals complained only of pain in the lumbar and sacral regions on bending and lifting.

Objectively, the only signs noted were local sensitiveness to pressure over the fifth vertebra, slight rigidity of lumbar column, with limitation of lateral flexion to one or other side.

From the foregoing brief résumé it will be seen that, apart from a careful analysis of the circumstances of the alleged casualty, a very thorough and discriminating physical examination is necessary to differentiate these various types.

Frequently, however, these cases only come under observation when years have elapsed, and the patient's recollection of the exact character of the accident has become dim and hazy. In this event we have to rely very largely on certain objective phenomena common to these more severe types of traumatic lumbago.

Objective Phenomena.

Collectively they consist of (1) static alterations in posture, (2) disorders of mobility, both these departures from normal being—at any rate primarily—restricted to the *lumbar* region of the column.

Now, with regard to these objective alterations, although we have for convenience of description deferred our account of them to the present stage, it must not be thought that they are distinctive of or confined to cases presenting ligamentary or osseous lesions; for they are also to be met with in instances of *strain or rupture of muscles*, provided they be severe in degree, or if their treatment in early stages has been inefficient or inappropriate.

With this reservation, we shall now proceed to describe in detail these various departures from normal in regard of posture and mobility.

Static Abnormalities.

In all the foregoing varieties of traumatic lumbago the lumbar column and pelvis are, as far as possible, immobilized, the subject automatically assuming the least painful pose.

This is due to the fact that the lumbar column and pelvis constitute what may be termed a " static unit." Consequently, given any severe injury, however localized, of these structures, every effort will be made to obviate, not only movement of the actually damaged segments, but also of those parts related to them.

This vicious pose, at first assumed for ease, later crystallizes into a fixed attitude, owing to the development of adhesions, and so in long-standing types of traumatic lumbago there is usually present some degree of static deformity.

Lumbar Scoliosis.—The subject walks usually with his trunk bent forward, with a list to one or other side. The lateral inclination in the majority of instances is toward the healthy side—crossed scoliosis—and only very rarely is it reversed in direction. As a rule the deviation begins at the level of the interval between the third and fourth or fourth and fifth lumbar vertebræ. It contrasts with ordinary scoliosis in that it takes place, not gradually, but *abruptly* or at a sharp angle.

When scoliosis presents itself in any given case of so-called " traumatic lumbago," we should, of course, be careful to ascertain that it is *primary*, and not secondary, to existing curvature in the thoracic column.

If secondary, there is also rotation, and the deviation admits of passive adjustment; but in the scoliosis of traumatic lumbago *rotation is absent*, and *correction is impossible.*

Diminution or Increase of Physiological Lordosis.—This is the most common static alteration we have met with in this association, and most frequently the lumbar curve is *flattened.*

An arched kyphosis of the lumbar spine has been noted in traumatic lumbago, but it is extremely rare. A definite gibbosity is never seen, but thickening of the column is often present.

Recently a case of so-called " traumatic lumbago " was sent to one of us for spa treatment. A well-marked gibbosity was present in the lumbar region; but, though the history of injury was clear, the condition was one of lumbar caries.

Disorders of Mobility.

As we know, the lumbar segments of the spine are very mobile, but, in order to appreciate fine departures from normal, we should familiarize ourselves with the characteristics of the healthy spine in this respect.

Thus, in ordinary flexion of the healthy column the following features are to be noted:

1. The individual segments separate from one another, and the distance between the first lumbar and first sacral spine is visibly increased.
2. The individual spines become plainly visible, and the normal lordosis is converted into an arched kyphosis.
3. In extreme forward flexion, while the lumbar spine plays the *primary* and chief rôle, this is reinforced or supplemented by *secondary* flexion at both hip-joints.

As opposed to the foregoing behaviour of the normal spine, in these types of traumatic lumbago the following departures therefrom may be observed:

Abnormalities of Forward Flexion.—Thus, in bending forward, the projection of the individual lumbar spines which ensues normally undergoes a change, in that, while the upper lumbar spines project, the fourth and fifth may remain invisible.

In other instances, the conversion during flexion of the normally existing lordotic curve into one of arched kyphosis does not occur. Instead, the *physiological lordosis persists*, the erectores spinæ standing out in bold relief on either side of the median furrow, the lumbar spines meanwhile remaining quite invisible.

Or the following deviation from normal forward flexion may occur: The lumbar spinous processes may project saliently, and yet the lumbar column only undergoes a *partial correction* of its usual lordosis. Viewed in profile, there is an absence of the convexity which ensues on flexion, while the distance between the individual spinous processes is not widened to the usual extent.

Lastly, *in extreme forward bending* the normal sequence is reversed. Instead of the primary movement of flexion taking place in the lumbar column, it occurs at the *hip-joints;* and, moreover, the secondary movement that ensues in the lumbar spine is much restricted in extent.

Abnormalities of Lateral Flexion.—To appreciate these, we should bear in mind that in the normal spine—

1. Lateral inclination begins at the level of the lowest lumbar vertebræ.
2. The sweep sideways of the column takes place gradually, and its contour is smooth and uninterrupted.

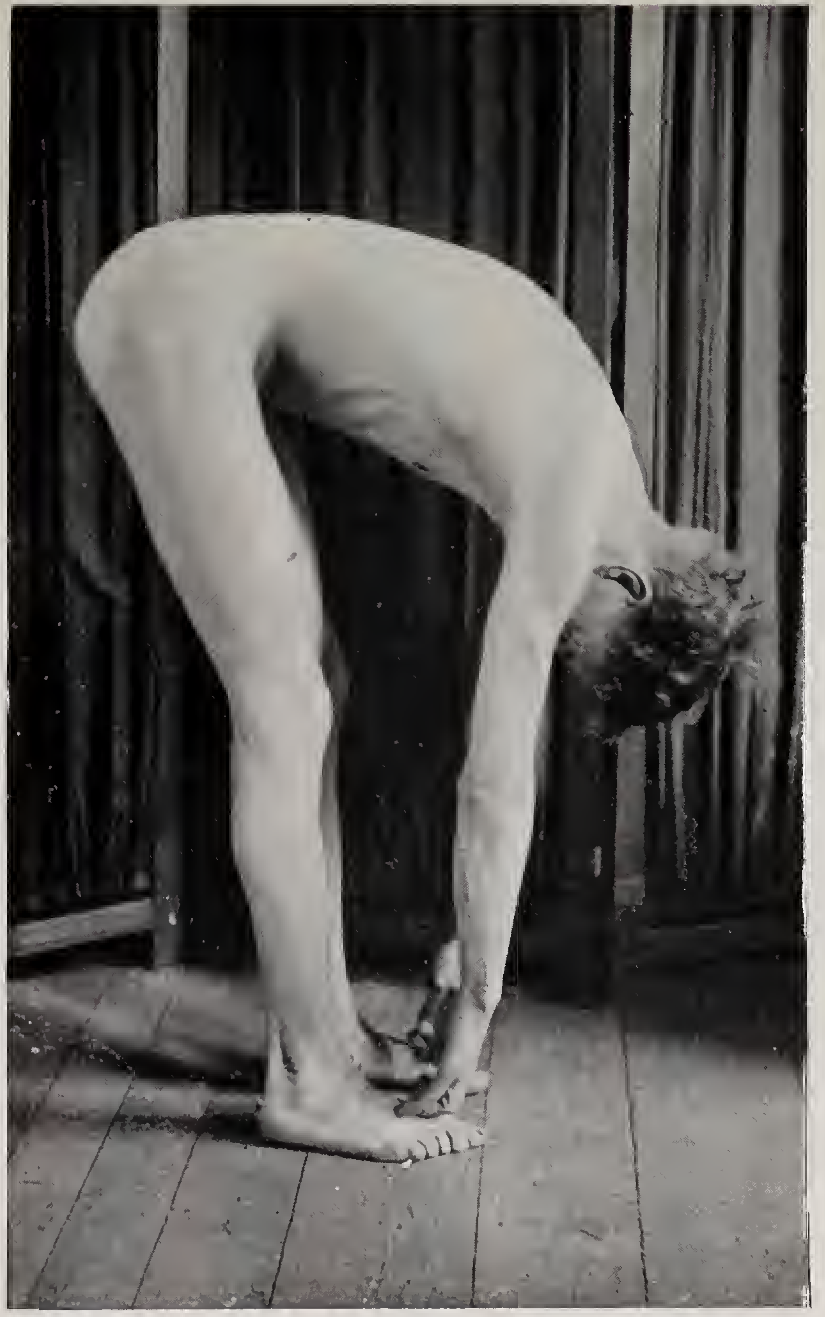


FIG. 112.—Normal anteflexion.

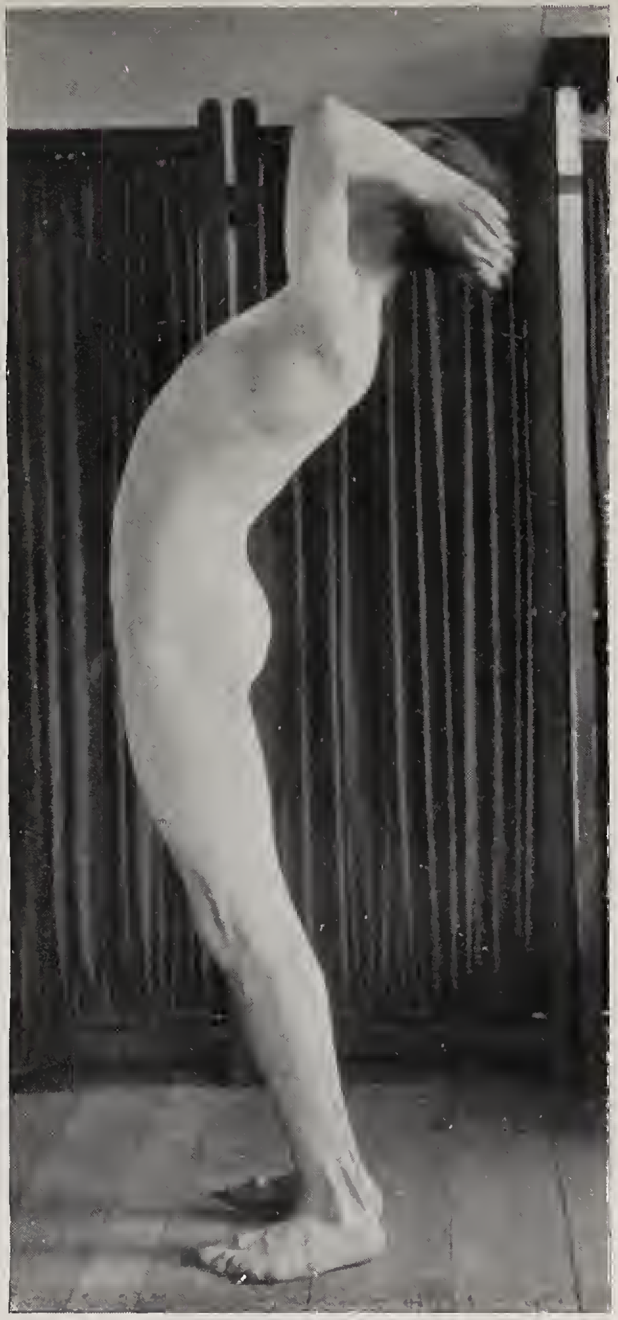


FIG. 113.—Normal retroflexion of spine

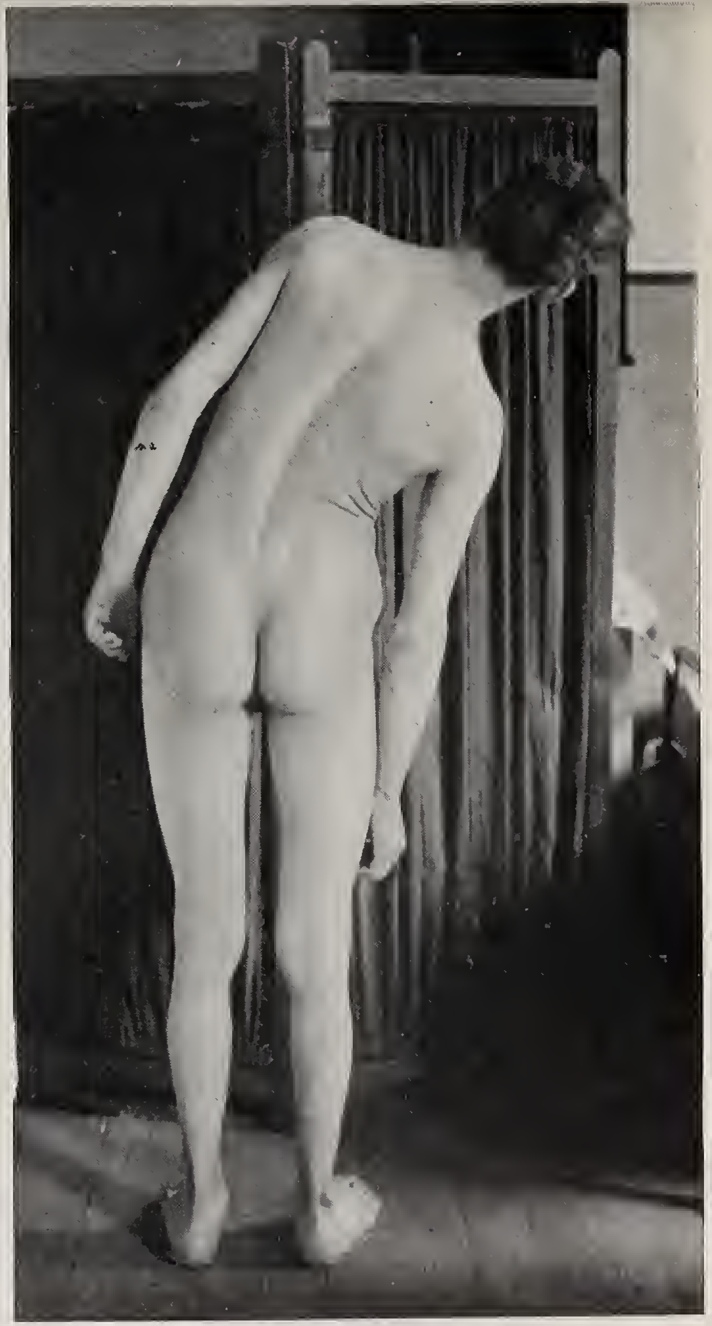


FIG. 114.—Normal lateral flexion. Observe creases in loin angle.

To face page 600.

As opposed to this, in traumatic lumbago the level at which the lateral deviation begins is displaced *upwards* and so, the lower part of the lumbar column failing to participate, these segments remain rigid and upright.

Consequently, in bending sideways, it is only the *upper* portion of the lumbar column which responds, curving abruptly or gradually in the direction of inclination.

In conclusion, it must be conceded that the foregoing static abnormalities and disorders of mobility are also to be met with in *atrophic and hypertrophic arthritis of the lumbar column.* But even so their presence in any given case of traumatic lumbago should immediately suggest the probability that an *anatomical* lesion is present, and that it is deep-seated. Its actual nature and differentiation from the different forms of lumbar spondylitis can, of course, only be achieved by the aid of *skiagraphy.*

Course of Disease.—The duration of the acute stages will, of course, depend on how far the necessary rest and appropriate treatment can be secured. Recovery is at best a matter of six to twelve months, as relapses are only too prone to occur under any exertion involving strain of the affected structures. The older the individual, the more likely is disablement to be permanent; and where actual fracture of a transverse process or a vertebra is present, the duration will be indefinite, and in any case the earning capacity materially depreciated.

Apart from the immediate disabilities induced, such severe injuries to the back are sometimes attended by sequelæ.

Shufflebotham, in an able contribution on this subject, has pointed out that, in forty cases of this nature under his care, fifteen developed *neurasthenia.*

In one instance under his observation the trauma seemed to be the starting-point of *diabetes mellitus,* and he urges that in all instances the urine should be examined. Glycosuria may appear a few hours after the injury, and disappear in a few days; but if it set in at a later period, it may prove dangerous or rapidly fatal.

Lastly, as this observer remarks, *obesity* may overtake these subjects, following the change from a life of strenuous activity to one of idleness.

Skiagraphy.

Though physical examination may aid us much in the diagnosis of the various lesions which may underlie traumatic lumbago, it is clear that for their exact identification skiagraphy is indispensable.

Routine examination of all cases by this method brings in its train many startling disclosures. Thus, for example, in a case recently under our care, of chronic lumbago of non-traumatic nature, skiagraphic examination revealed the presence of *osteo-arthritic changes in both sacro-iliac synchondroses*, all of which were situated on the pelvic surface of these articulations.

In another instance, where the subject was exposed to much muscular overstrain, the cause of his backache proved to be an *osteo-arthritis of the lumbar articulations.*

Marginal exostoses have been noted by some observers, especially on the *third* and *fourth* lumbar vertebræ; but Wagner and Stolper state that such are more commonly observed in the *fourth* and *fifth* segments.

It is important also to remember that *fractures of the transverse processes,* as well as of the fifth lumbar vertebra, may result from muscular overstrain. Consequently, in any given case of chronic recurring lumbago, this possibility should not be overlooked.

In the absence of such gross injuries, the radiograph must be carefully scrutinized for less obvious departures from normal in the bony structures.

Thus, *change of form or obliquity* of the lumbar vertebra should be noted, likewise any unilateral diminution or attenuation of the intervertebral discs.

Owing to the fact that the arches and articular apophyses are overshadowed by the vertebral bodies, the appreciation of slight alteration in these structures demands great experience on the part of the observer.

The transverse as well as the spinous processes must be scanned for the presence of marginal exostoses, and care taken likewise not to miss *calcification of the ligaments,* as shown by shadows falling beside the vertebral bodies. Repeated examinations may be necessary to establish thickenings or rarefactive changes in the segments or their processes, or obliteration of the lateral spinal joints.

Diagnosis.

Early diagnosis in this condition is of prime importance, for, if the nature of the lesion be misunderstood or under-estimated, treatment is but too apt to be perfunctory and inadequate. Consequently, the secondary inflammatory changes that ensue in the damaged structures proceed unchecked, and more or less permanent disability results.

Now, as may be gathered from our clinical account, the site and degree of the injury sustained vary according to the severity of the trauma, the attitude of the subject at the time of the

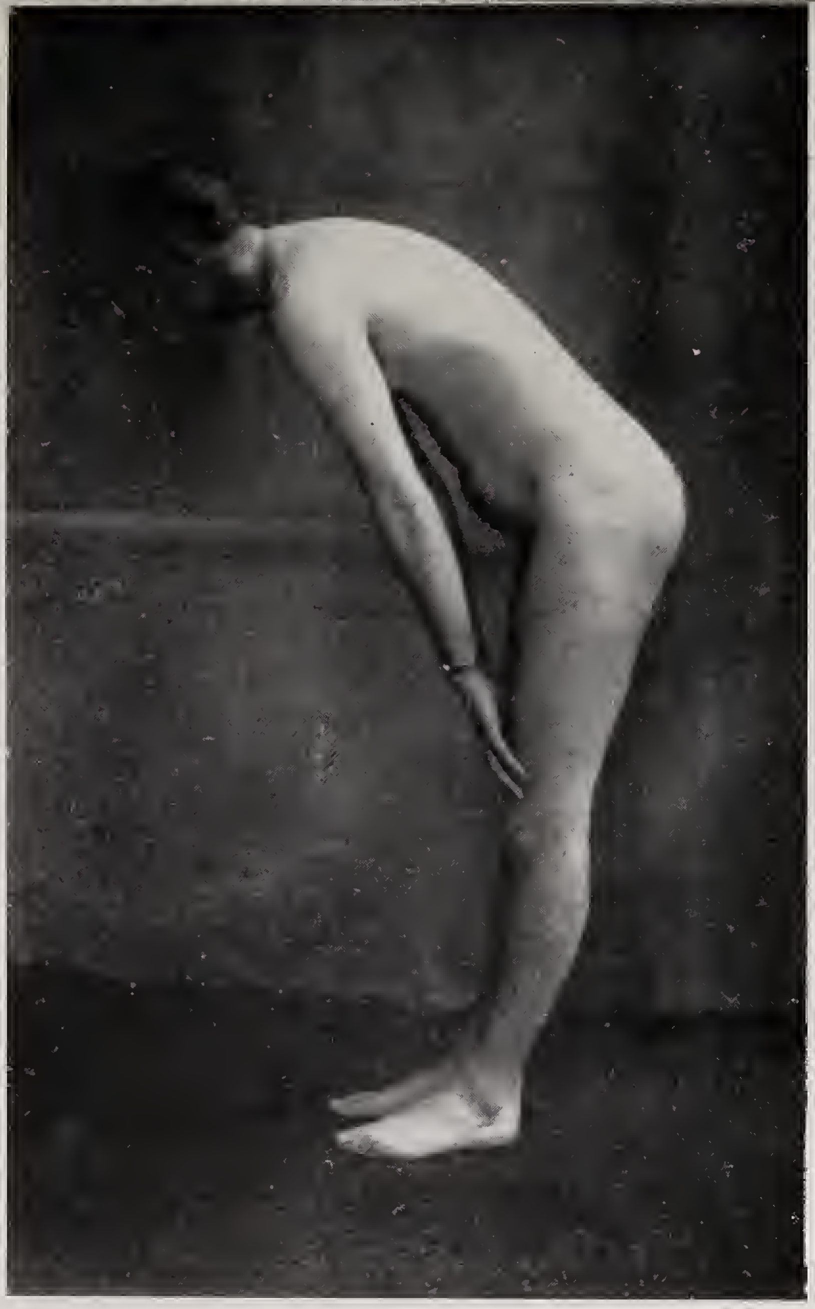


Fig. 115.—Traumatic lumbago. Shows limitation of range of anteflexion. Note only partial obliteration of lumbar lordosis.

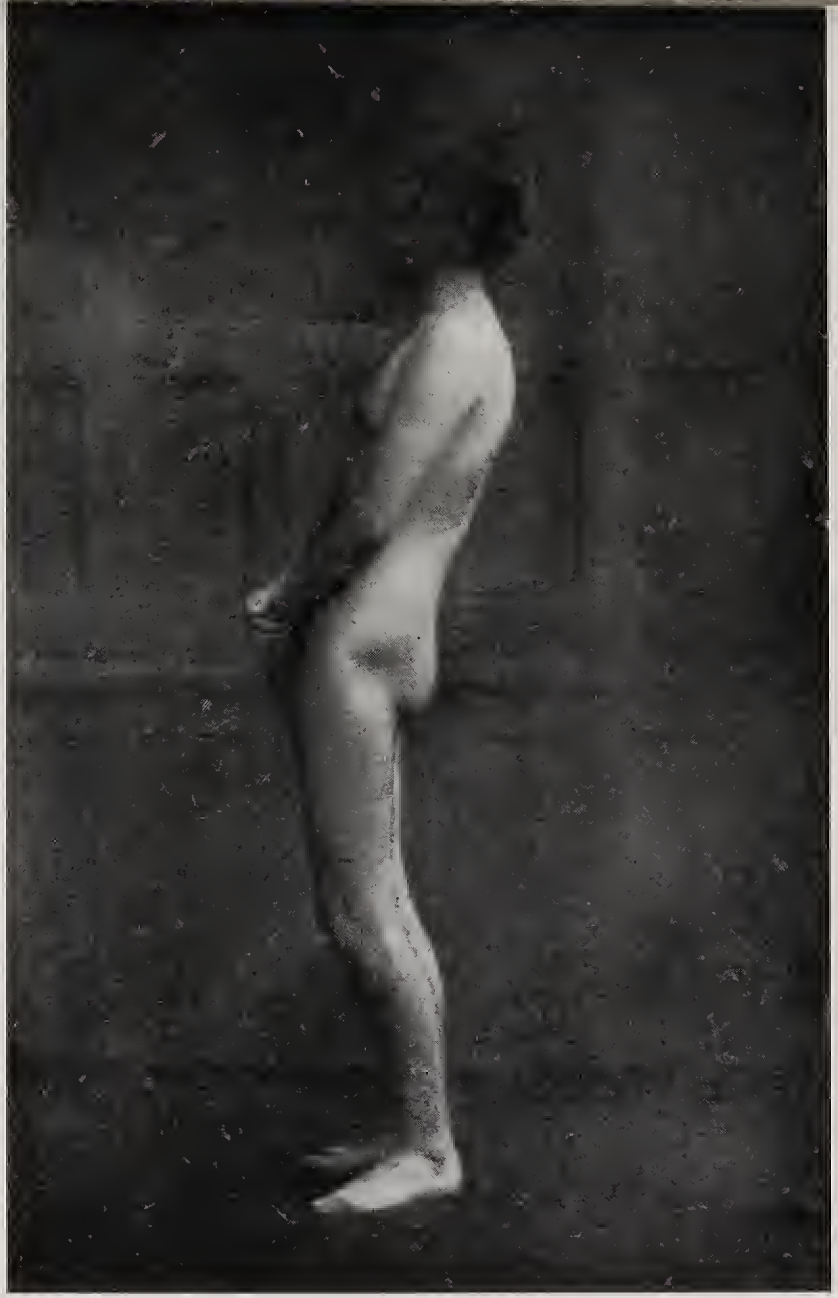


Fig. 116.—Traumatic lumbago. Limitation of backward flexion.

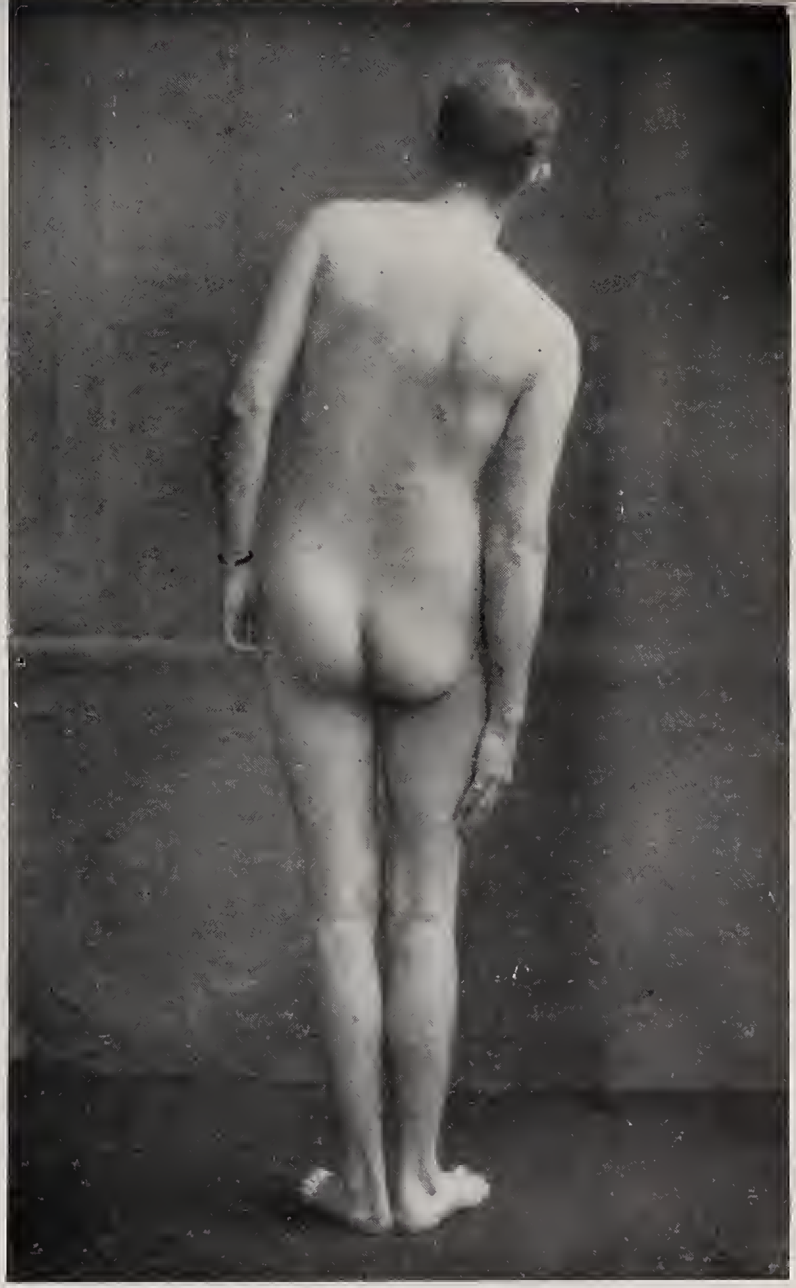


Fig. 117.—Traumatic lumbago. Note limited range of lateral flexion to right, and failure of participation on part of lower lumbar vertebræ.

To face page 602.

casualty, the nature of the task engaged in, and other contingent circumstances.

Obviously, therefore, a careful study of the history is of prime importance, inasmuch as it may assist greatly our attempt to localize and define the particular injury in any given case.

Having dealt at length in the etiology with the mode of production of the various lesions, it will suffice here if we point out the necessity of ascertaining whether they are of extrinsic or intrinsic source, and of direct or indirect kind.

This aspect of the case having been thoroughly investigated, it now devolves upon us to ascertain to which particular type of lumbago the case under consideration most closely conforms.

Muscular or Tendinous Lesions.

Sex and Age.—The persons affected are nearly always males, twenty to fifty years of age, who are engaged in arduous occupations—miners, iron-moulders, puddlers, etc.

Onset.—This is abrupt.

Pain.—This is immediate, strictly localized, almost always *unilateral.* If partial rupture, it is aggravated by extension or contraction of injured muscles, their opponents, or synergic allies. If complete rupture be present, not so.

Tenderness.—At first it is diffuse, with a point of maximum sensitiveness, but later it is confined to the site of the lesion.

Local Signs.—In recent cases there may be local *swelling*, *effusion*, and *ecchymosis*, but the latter may appear remotely—*e.g.*, in the buttock from laceration of the erector spinæ. A gutter-like depression or sulcus in the muscle may be detectable if such be severed completely.

Complications in Acute Stages.—Hæmaturia, glycosuria.

Functional Effects.—At first disablement is usually absolute, owing to pain; later it is restricted to injured muscle, which, if rupture be complete, is powerless; if partial, weak, stiff, and painful.

Late Phenomena.—Lateral deviation of lumbar column to affected side to relieve tension—at first voluntary, later becoming fixed through adhesions.

If both erectors be weakened, lordosis may be exaggerated. Wasting of injured muscles, usually unilateral, with altered electrical reactions, may be present.

Indurations in muscle or fascia are often present, with possibly *referred pains* along the twelfth dorsal, ilio-inguinal, and ilio-hypogastric nerves.

Ligamentary Lesions.

Posterior Spinal.—In strain or *partial* rupture of these ligaments there is deep-seated pain, aggravated by *flexion*, and tenderness on palpation over the site of lesion.

Complete rupture of posterior ligaments between two vertebræ is characterized by the following: Pain is more acute when standing, while a localized kyphus is present in erect position. This projection disappears on lying down.

Sacro-Iliac Ligaments—Strain or Slight Tears.—There is local pain over the synchondrosis, usually unilateral. Referred pains along the sciatic and obturator trunks are present. The pain is increased by straight-leg flexion, and this owing to spasm of hamstrings and consequent dragging on sacro-iliac joint. Inclination of lumbar column to *affected* side is present, with limitation of movement *away* from lesion. There is obliteration or exaggeration of lumbar lordosis, the former being more common. All movements are painless on fixation of pelvic girdle.

Lesions of Lateral Vertebral Joints.—Pain and tenderness over the affected joints, commonly the third, fourth, and fifth lumbar, are present. Pain is aggravated by *extension* of the spine. There exists marked tenderness over the site of painful joints on direct pressure inwards towards the vertebral column. Lateral deviation to the *healthy* side is present, at first voluntary; but later the scoliosis is fixed.

The foregoing constitute the chief types of traumatic lumbago, and, when of recent origin and well marked, they can as a rule with care be differentiated.

Oftentimes, however, the date of injury is remote, and the account thereof vague, and in this event we have to rely almost entirely on objective phenomena to substantiate the occurrence of the alleged injury.

The signs that should lead us to suspect the presence of serious *muscular, osseous*, or *ligamentary* lesions are—

Static Abnormalities.—Lumbar scoliosis, with abrupt deviation at the level of the third and fourth or fourth and fifth lumbar vertebræ, is to be noted. Diminution or increase of physiological lordosis is also present.

Disorders of Forward Flexion.—The fourth and fifth lumbar spines may be invisible on forward flexion, while the first, second, and third project normally. Persistence of normal lordosis on flexion, instead of the usual kyphosis with salient projection of lumbar spines, may be observed. Primary movement of flexion occurs at *hip*, while movement of spine is secondary and restricted—viz., the normal sequence is reversed.

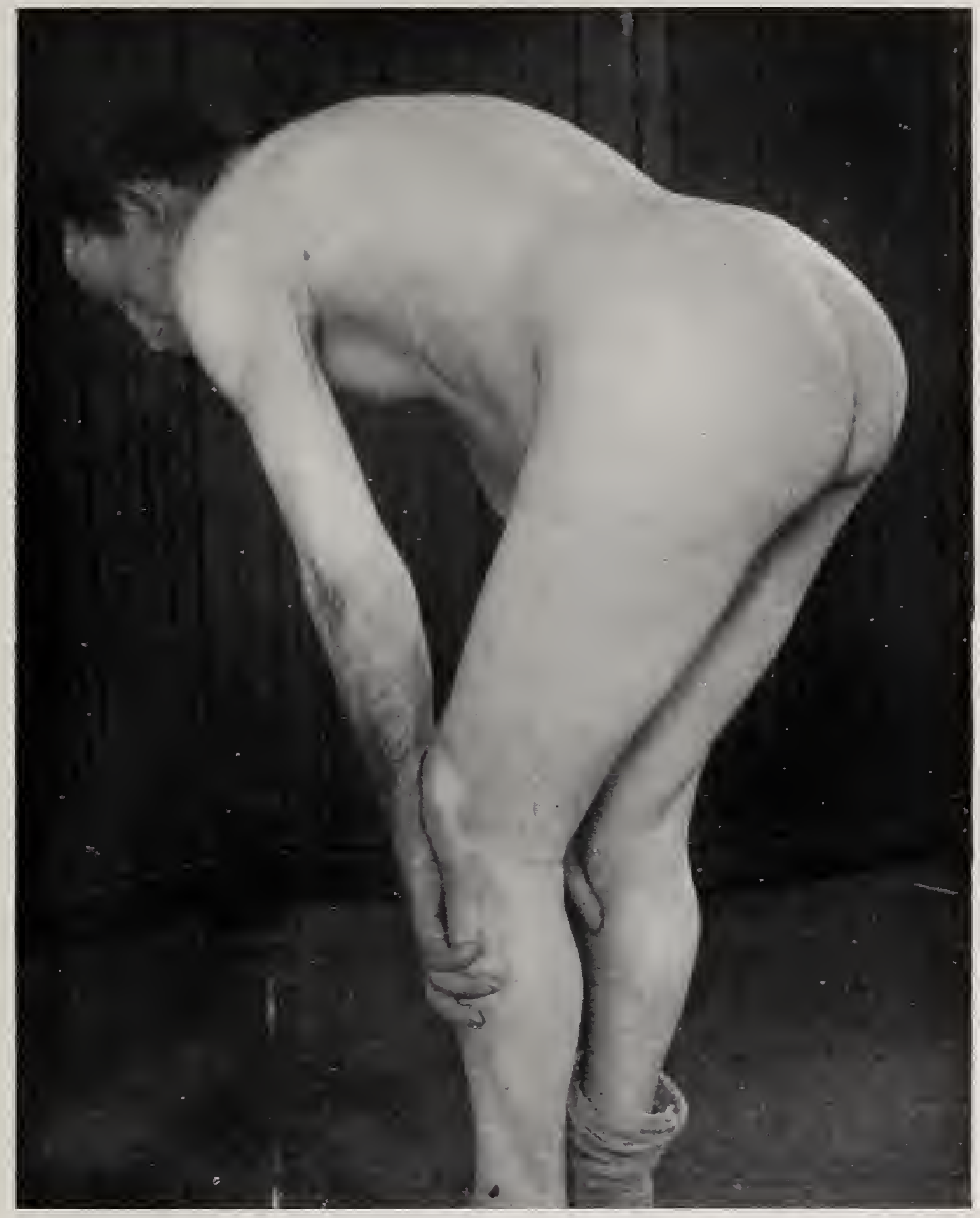


FIG. 118.—Lumbar spondylitis. Note persistence of lordotic curve on forward flexion.

To face page 604.

Disorders of Lateral Flexion.—The lower part of lumbar column is rigid and upright, while the upper portion curves abruptly to one or other side.

Finally, skiagraphy as a final court of appeal should be resorted to as the only certain means of excluding fracture of the transverse processes or bony changes in the vertebræ.

Differential Diagnosis.

When recent and of severe type, it is often a matter of difficulty at first to distinguish these cases from instances of actual *fracture of the spine;* for, owing to the agonizing pain that ensues on movement, the back is kept rigidly immobile, and paraplegia may be simulated, though definite nerve symptoms usually are absent, unless intraspinal hæmorrhage is also present.

Fracture Dislocation of Spine.

This should be excluded by the severity of the initial symptoms, often attended by collapse.

Additional signs would be the presence of *deformity* and *crepitus, symptoms of sensory and motor involvement,* and *loss of sphincter control.*

Simple Acute Lumbago.

History.—There is an absence of trauma, and generally an account of previous attacks of fibrositis elsewhere is obtainable.

Onset.—The *primary* attack is as fulminantly sudden as in cases of traumatic origin, but subsequent seizures are often preceded by stiffness or other abnormal sensations in the loin.

General Symptoms.—Slight fever is often present, also gastric derangement.

Pain.—This is rarely so acute as in the traumatic type, and not so totally disabling. It is aggravated by voluntary contraction of the muscle, but flexion and extension of the column are painless if executed *passively.*

In the traumatic form, all movements involving *active or passive extension* of injured muscle are painful.

Site.—The pain is diffused over lumbar region, and not so commonly as in traumatic form localized to the tendinous attachments of dorsal muscles to iliac crest or sacro-iliac region. It is *bilateral,* and not unilateral, as in traumatic type.

Tenderness.—This is diffused over loin, but in the traumatic form it is generally localized, and always more pronounced at site of lesion.

Duration.—Days, as opposed to weeks or months in traumatic form.

Complications.—Subsequent *sciatica* is common, but not in the traumatic form save when the injury is localized to the *sacro-iliac joints or ligaments.*

Simple Chronic Lumbago.

History.—The occurrence of a series of acute attacks or exacerbations can always be ascertained.

Pain.—This is usually *bilateral,* increased by trivial causes—chill, exercise, etc.

Tenderness.—This is localized to the site of *nodules or infiltrations.* There is an absence of any alteration in the spinal curves, while the mobility of the column in passive movement is untrammelled. Skiagraphy is negative.

Lumbar Spondylitis.

Atrophic Type, or Spondylose Rhizomélique.—Confusion is only possible in the *early* stages, when the disease is confined to the lumbar column. Marked rigidity of this region of the spine and frequently previous or coincident *ankylosis of the hips* is present. The pains are both local and referred. Later there is marked dorsal kyphosis together with absolute immobility of the spinal and costo-vertebral articulations, as well as of the shoulder-joints. Skiagraphy may disclose existence of atrophic changes.

Hypertrophic Type.—This is characterized by the following features: Progressive pain and stiffness, at first limited to the affected segments. The lumbar curve is normal or flattened. Great rigidity of the lumbar spine, and in later stages, referred pains from pressure by exostoses are present. Skiagraphy shows osteophytic outgrowths.

Elongation of the Fifth Lumbar Transverse Process.

Recently a number of observers have called attention to this condition as a cause of chronic lumbar pain, which is also reflected down the lumbo-sacral cord. It constitutes the precise analogue in the lumbar region to cervical rib. The elongated process during lateral movement impinges on the iliac crest or top of sacrum, and causes pain.

Moreover, as Goldthwait has pointed out, if the side movements be sufficiently forcible, the elongated transverse process through its leverage may even cause dislocation of the fifth lumbar vertebra, with paralysis. In many cases symptoms are absent, which, of course, is also true of cervical rib.

We ourselves have only met with one instance of chronic lumbar and sciatic pain attributable to this cause. In this particular instance, the very duration of the pain—viz., over twenty years—immediately suggested some long-standing or *congenital* cause; and here again we see an analogy with cervical rib, the symptoms of which have very commonly endured for years.

The pain was aggravated by lateral flexion to the right side, and the pose adopted by the subject was precisely what one would expect him to assume to lessen pressure and reduce pain.

The condition was right-sided, and he stood with the shoulder on the same side tilted upwards, presumably with the object of drawing the lumbar column and transverse process upwards and away from the crest.

At the same time he kept his lower limb flexed, so as to admit of lowering of the pelvis on this side, and so to withdraw the ilium from contact with the transverse process.

Skiagraphy, of course, is necessary for the identification of this lesion, and the possibility of its presence should always be canvassed in lumbar pain of long standing.

Treatment.

Despite the variety of the anatomical lesions, the principles of treatment are in the main identical, comprising *rest for the damaged structure*, *control of the secondary inflammatory changes*, and, lastly, the *restoration of mobility*.

It will, however, be convenient to deal in the first place with the commonest types of the disorder—viz., those due to muscular lesions—and subsequently with those instances in which the ligamentary and osseous structures are involved.

Strain or Rupture of Muscles.

Examples of Recent Date.

Immediate and absolute rest in the horizontal position for some days is essential. This in the more severe forms is easy of enforcement, so intense is the pain produced by movement of the parts.

For the *relief of pain*, chief reliance should be placed on fomentations or compresses snugly applied, and combined with anodyne applications. Occasionally, for the first night or two, it may be necessary to resort to hypodermic injections of morphia, or some narcotic, such as chloral or bromides.

As a rule there are no further indications for internal medication, save when bruising of the kidney with *hœmaturia* is present. In such event, free renal excretion should be encouraged by the ingestion of bland unirritating fluids, supplemented, if necessary, by special treatment.

In the milder forms, where the muscles or their tendons are only slightly strained, much will depend on the patient's circumstances. If the necessary rest in bed can be obtained, so much the better; but if not, the parts should as far as possible be immobilized by firm strapping.

One serious objection to strapping of the seat of injury is that the relief from pain that it procures may dissuade the patient from a timely resort to massage and exercises. For he is apt to fondly believe that, if continued long enough, the power of painless movement will be restored, but, unfortunately, *adhesions* are too apt to form at the site of the lesion.

Ultimately, therefore, he finds that, whatever care he exercises, some unguarded movement lights afresh the pain by dragging on these adventitious bands.

In all cases, therefore, to avoid such untoward consequences, *massage* should be resorted to, and, if possible, from the very first day. It need hardly be said that it should be applied with as little disturbance of the patient as possible, and should take the form of skilful stroking or effleurage.

No agent is of such value in hastening the absorption of effusion, diminishing tension, and relieving pain. Sometimes, as in sprains elsewhere, extravasated blood in sequence to the manipulations is brought nearer to the surface, but the discoloration should not interfere with the continuance of massage.

With increased tolerance of the parts, the rubbing should be more vigorous, and the length of the séance extended from fifteen to thirty minutes. It should be administered at first once, then twice, a day, and as soon as possible each séance should terminate with *exercises*. These should be systematic, and include trunk flexion and extension as well as lateral inclination and rotation.

If, as sometimes happens, the latissimus dorsi is the injured muscle, elevation of the arm and placing it behind the back should be practised assiduously. Supervision is necessary, as, if left to himself, the patient is certain to avoid a particular movement which occasions him the most pain. He should be warned that, though movement is painful, it is necessary for cure, and that, if shirked, more or less disability may persist for months or even years.

Under this mode of treatment, as a rule, recovery takes place in from three to five weeks, and there can be no doubt that the results obtained by this method are superior to the older plan of prolonged fixation of the parts.

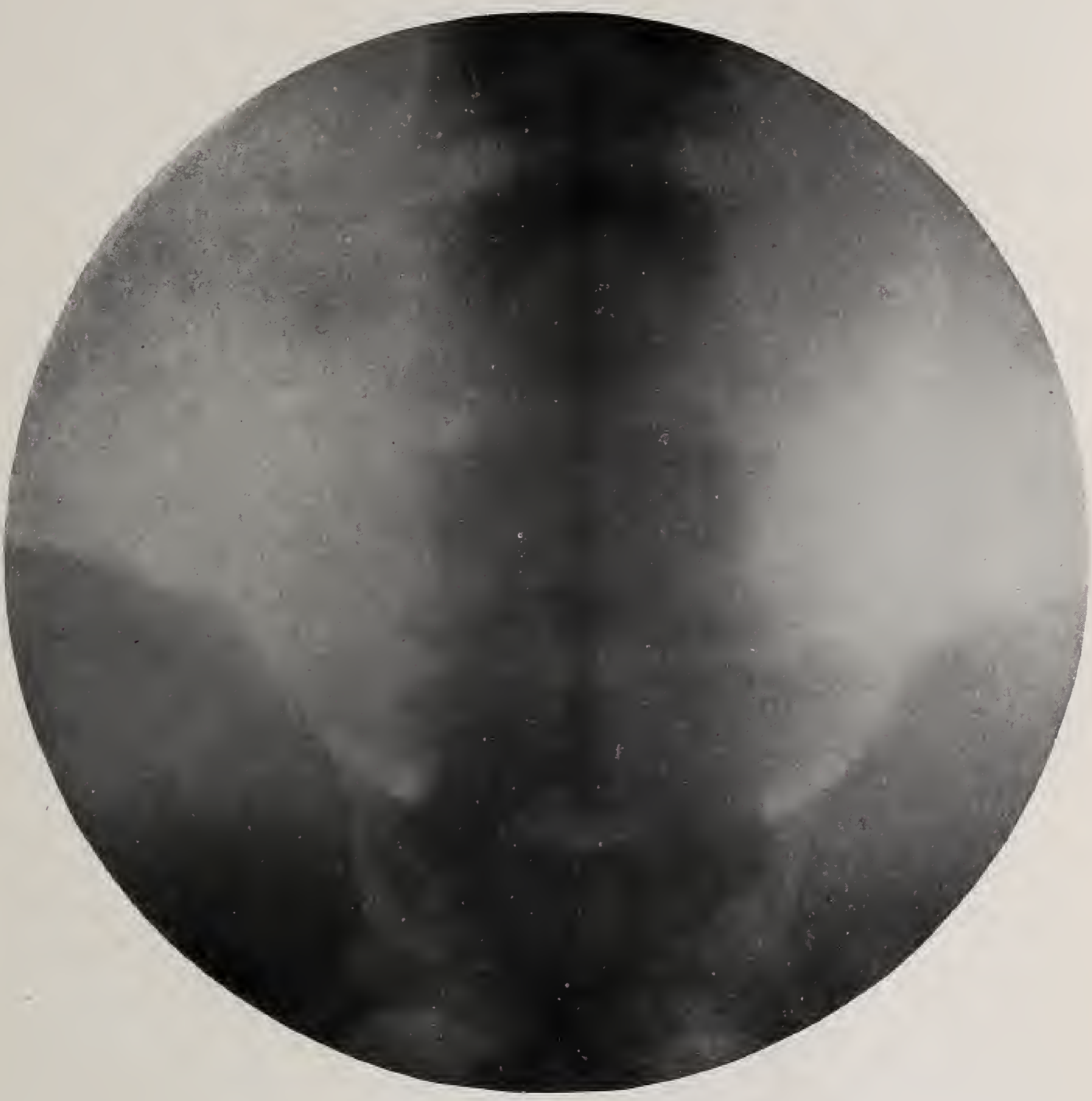


FIG. 119.—Skiagram of the lumbar spine and pelvis of a man who had suffered from lumbar and sciatic pain for over twenty years. The sciatica proved intractable to all forms of treatment, surgical and otherwise. Note elongation of the fifth lumbar transverse process, which on the affected side touches the iliac crest.

Cases of Long Standing.

The symptoms that usually call for treatment in these cases are obstinate pain, with or without muscular wasting, or weakness and deformity.

For the *relief of pain,* nothing is more efficacious than counter-irritation, either by means of blisters or the actual cautery. Repeated applications may be necessary, and by some physicians subsequent dressing with savin ointment combined with cocaine is advocated.

Subsequently, when pain and tenderness are brought under control, massage, exercises, and hydrotherapy should be resorted to.

When *muscular atrophy*—generally unilateral—has ensued with contracture leading to lumbar scoliosis, a course of corrective gymnastics with massage and electricity offer the best chance of amelioration.

But before embarking upon such measures, a preliminary skiagraph of this portion of the column should be taken to exclude *bony* change. Provided the trouble be purely *muscular,* treatment by the means suggested often proves very successful. But supervision is called for, as it is clear that aggravation of the curve or rotation may readily ensue through ill-directed exercises. Moreover, patients with such curvatures are very readily fatigued, and therefore, after a séance of massage and exercises, rest in a recumbent position is highly essential.

The beneficial effects of these procedures are markedly enhanced by the simultaneous employment of hydrotherapy—viz., alternate hot and cold douches, followed later by cold percussion douches.

While the foregoing represent what may be termed the routine treatment generally adopted in traumatic lumbago, it is necessary to allude to the more radical measures recently advocated by Romer and Creasy in some of these cases.

These observers claim that, in instances marked by *unilateral muscular atrophy and contracture on the affected side,* the presence of *adhesions* is the main obstacle to recovery.

The following quotation illustrates the technique they are accustomed to practise for the forcible rupture of such bands: "An anæsthetic having been given, the method employed is this: The leg on the sound side is flexed at the knee, and the thigh flexed on the body till the knee touches the chest wall. It is then brought back to the extended position. The leg on the affected side is now put through the same movements, and comparison can be made as to the difference in resistance. Both legs are now brought up together, and both knees should be kept pressed against the chest for about a minute. The legs having been brought to the extended position once more, the patient is now raised to the sitting posture. The operator places one hand firmly on the affected side, whilst with the other he thrusts the patient back on to the couch. The hand in the small of the back, acting as a fulcrum, causes extension of the part. By these movements full flexion and extension of the lumbar region is obtained. Pain rarely follows these manipulations, and greater freedom of movement is experienced almost immediately afterwards, but treatment by rubbing and exercises will be essential before recovery can be considered complete."

Encouraging as are the results claimed by these observers, it is obvious that such drastic measures should only be undertaken after an exhaustive X-ray examination of the lumbar column, as muscular wasting and rigidity may readily conceal *bony* alterations in the vertebræ.

As for ourselves, we must admit to not having practised this manœuvre, and we should not be inclined to try it until all other modes of treatment had been thoroughly and perseveringly employed.

Ligamentary and Osseous Lesions.

Strain or Rupture of the Spinal Ligaments.

In these graver types of traumatic lumbago involving *strain or rupture of the spinal ligaments,* rest at first in the recumbent posture is essential, and care should be taken that the mattress on which they recline be not allowed to sag.

For mitigation of the pain, which is often intense, we should rely chiefly on local anodyne applications and firm bandaging or strapping, avoiding save in the last extremity any recourse to narcotic drugs.

In cases of simple *strain* these measures will usually suffice to control the suffering, but as there is great danger of these subjects drifting into a *neurasthenic* state, massage, hot-air baths, and hot douches should be resorted to as soon as possible, and the patient encouraged to use his stiff and painful back. To the same end he should be counselled to resume if feasible his customary avocation, and in any case every effort should be made to counteract by mental diversion the too common tendency in these persons to morbid introspection and the development of invalid habits.

When there is reason to expect actual *rupture* of the ligaments, usually the posterior, immediate *fixation of the spine* is called for. In this lesion, as we know, a kyphus is present in the erect position, and disappears on lying down. Accordingly a plaster jacket should be applied in the corrected position, and the patient remain recumbent until convalescence is established. Massage and progressive use of the spine should then be practised, but in the intervals the use of a spinal support is advisable pending the cessation of all pain on movement.

Recently a case came under our notice in which the circumstances of the casualty suggested strain or tearing of the *anterior* spinal ligaments. The subject, a soldier, on sallying forth from the trenches to participate in a counter-attack slipped backwards, and in his endeavour to recover himself sustained a severe wrench. He was immediately placed *hors de combat*, and subsequently being invalided to England, he came under our notice some two months after the occurrence of the mishap. When first seen he was unable to walk save when supported on either side, and then only with his spine flexed almost at right angles to his lower limbs.

He complained of severe, unremitting, and deep-seated pain in the lower region of the lumbar column, which was greatly intensified by, and indeed negatived, any attempt at correction or backward movement. There was no affection of the sphincters or deep reflexes, nor any sensory or motor phenomena indicative of a cord lesion.

Without any attempt at correction of his postural forward flexion, a plaster jacket was applied which immediately relieved his suffering. After a fortnight it was removed, and he could then stand a little more erect when the jacket was reapplied, and gradually, after several repetitions of the same procedure, he was able to voluntarily assume an almost upright attitude.

This same treatment by immobilization should be followed in the case of *strains of the intervertebral joints*, but both in ligamentary and articular lesions, as soon as the acuteness of the symptoms has abated somewhat, resort should be had to massage, radiant heat, hot douches, and movement of the spine.

In examples of injury of the intervertebral joints, if seen at a later stage, there is often present some *lateral deviation of the lumbar column*. Before attempting its correction by exercises, an X-ray examination should be undertaken to exclude *bony* alterations. If such are present, no attempt should be made by forcible manipulation to correct the deformity or to obtain more freedom of movement in the spinal articulations. In such examples fixation of the spine is called for by a webbing belt or corset, or a leather jacket may be substituted. Such fixation lessens the pain, and, moreover, inasmuch as the curvature may be accentuated by muscular spasm, the support, by tending to diminish its degree, corrects a certain measure of the deformity.

CHAPTER XL

MALINGERING IN RELATION TO TRAUMATIC LUMBAGO

Traumatic lumbago is one of the "injuries" or "accidents" in which a large number of claims are put forward under the Workmen's Compensation Act. That this is so is not surprising, when we reflect how easy it is to complain of "pain in the back," how difficult to establish or disprove the truth of the assertion.

Of this fact, unfortunately, the fraudulent-minded are fully aware, and, inasmuch as at any moment and in any class of practice we may be confronted with the malingerer, it is well to be familiar with his disguise and prepared to unmask his deceit.

Cases of unmitigated imposture are rare, the majority being examples of *partial malingering*, where the claimant consciously or unconsciously exaggerates the degree of his suffering and disability.

In either case the surest aid to their detection is an intimate acquaintance, not only with the symptoms and features of real disease in this region, but, what is equally important, familiarity also with the appearance and mechanism of the normal lumbar spine.

This point needs emphasizing, as there is too great a tendency to regard the detection of malingering as merely a question of applying ruses or devices, which by their unexpectedness often dramatically reveal the true impostor. That these have their place and use we fully admit, but we should not forget that the first step towards the detection of malingering is, or should be, *the exclusion of real disease.* For malingering and true disease frequently coexist, and while the imposture may be revealed by some strategical move on the part of the physician, his reputation for astuteness may suffer greatly, if through lack of a thorough physical examination any associated morbid condition be overlooked.

Bodily disease having been excluded, the physician can with a clear conscience resort to the second stage of the diagnosis—*i.e.*, *detection of the imposture.*

For this purpose no stereotyped method will avail, and all will depend upon the resourcefulness of the examiner, his powers of observation, the shrewdness of his insight into human nature, and his fertility in originating devices wherewith the impostor may be entrapped and shown up in his true colours. Outwardly it is well to preserve an impassive attitude, while at the same time keenly observant of the claimant's behaviour. Leading questions should be avoided, and every effort made to disarm suspicion. While carefully noting inconsistencies of speech or action, comments should be refrained from, the subject being rather encouraged by sympathy or suggestion to overact his part, and so, by an accumulation of evidence, to establish his lack of veracity.

So much for the general attitude that should be assumed, and now it remains for us to indicate the more exact details and method of conducting the examination.

Investigation of a Supposed Case of Malingering.

This should comprise—(1) Study of the past history of the individual; (2) analysis of the circumstances of the alleged casualty; (3) a searching general and local physical examination.

1. *Past History.*

This is highly important, inasmuch as it may disclose the presence of some constitutional tendency predisposing to morbid disorders in this region. The bearing of this is patent when we reflect that ordinary lumbago very commonly comes on either during work or following the assumption of some strained attitude or some sudden but not necessarily violent exertion.

Consequently, the mere allegation of an "accident" as the cause of lumbar pain must always be taken with reserve, and before conceding its traumatic origin inquiry should be made as to the following points:

Had the subject experienced any premonitory symptoms of discomfort or stiffness in the loin, or had he suffered previously from definite attacks of lumbago, sciatica, or other "rheumatic" manifestations?

Positive evidence of such would be very suggestive of a diathetic cause, especially if the account of the "injury" be not very circumstantial.

One source of fallacy to be guarded against is the danger of classing as "traumatic" instances of lumbar pain which are simply due to fatigue or exhaustion. It is, therefore, always wise to inquire whether the subject has recently embarked upon some unaccustomed employment, such as digging or shovelling; for under such circumstances it is but natural that, having experienced his first touch of pain while engaged in some physical work, he should attribute it to his occupation. His plea is all the more reasonable in that his lumbar muscles may become, not only painful, but actually swollen, as the result of his toil, and in that his ailment may be classed as " an occupation " disorder, though it cannot be regarded as a *bona-fide* " accident."

These are not examples of genuine " traumatic " lumbago, for after a day or two's rest, or after becoming inured to the class of work, their pain and stiffness disappears. It is rare indeed for the disablement to persist for long unless the question of compensation arises, and marked disinclination to return to work —despite the assurance that the pain will probably wear off as the muscles become seasoned to the toil—is always suggestive of partial malingering.

Suspicion also should be aroused if the instance of " backache " is one of a series occurring in swift sequence among a body of workmen following the same employment, as such veritable epidemics have been noted, and point strongly to malingering.

The primary case was probably genuine enough, but, failing definite evidence to the contrary, the subsequent examples are almost certainly the outcome of deliberate and planned deceit.

Albeit it must not be forgotten that cases of simple lumbago too often appear in batches in damp or rainy weather, and it is significant that claims for " traumatic " lumbago have been known to increase during the presence of such atmospheric conditions. When, therefore, under these environmental circumstances a series of cases of " backache " crop up, we should be chary of admitting forthwith their " traumatic " origin, for, obviously, " traumatic " lumbago is independent of climatic vagaries.

Last, but not least, we should judiciously scan the patient's past history for evidences favourable or otherwise as to his moral character, which may assist us greatly in proving his susceptibility or not to unworthy motives.

2. *Analysis of Circumstances of the Alleged Casualty.*

Only too frequently the alleged " injury " is of remote date, and the subject's evidence should be critically weighed in order to ascertain the all-important point whether an " accident " has or has not occurred. Misgivings as to his *bona fides* may be entertained if he be at all hazy as to the time, place of occurrence, or nature of the " casualty," for in genuine " traumatic " examples information on these points is usually clear-cut and circumstantial.

He should be interrogated as to the nature of the " injury," his attitude at the time, the condition of his muscles, whether taut or relaxed, and the nature of the surface he was standing on. For, as a reference to a previous section on the etiology of traumatic lumbago will show, a careful analysis will enable us to form a shrewd estimate as to the site and extent of the " injury," and the likelihood or not of more or less permanent disability resulting.

Where lifting, pushing, or carrying heavy objects is the alleged cause, inquiries should be made as to the circumstances, as the greater the weight raised, the more probable the occurrence of some anatomical lesion, such as laceration or rupture of tendinous structures.

Sometimes it is not so much the actual weight lifted as some sudden slipping or unpreparedness on the part of the workman, who may, moreover, be awkward or careless in making the required effort—a matter of some moment in estimating the validity of the claim.

Lastly, all the inferences that we may have drawn from the forthcoming narrative should be weighed by the results of physical examination, and any discrepancies between the subjective statements and objective findings noted.

3. *Physical Examination.*

It is well to preface our local scrutiny of the lumbar region by a general survey of the patient in regard of his vital organs and conformation. The latter point—the subject's configuration—is all-important; for, as has been shown in previous sections, abnormalities of this nature may strongly predispose to " backache."

The features to note are the existence of *obesity, round shoulders, flat feet, knock-knee, and congenital or acquired inequality in the length of the lower limbs.* For the presence of any of these static disproportions predisposes to strain of the lumbar region, and the alleged " trauma " may be simply the occasion of the appearance of " backache," and not its fundamental cause.

Unfortunately, in works dealing with the subject of malingering, but little notice, if any, is taken of these *static* factors, and consequently the enhanced liability of their subjects to lumbar strain under *relatively normal* conditions of work is not allowed for.

For it is quite clear that a person handicapped by flat feet, or some other static deformity, is working at a mechanical disadvantage, and the latent disability of the subject sooner or later becomes manifest, finding expression in the form of *secondary* lumbar strain.

But inasmuch as the causal static flaw in these cases is often overlooked, the would-be claimant is only too likely to be stigmatized offhand as a pure malingerer, which is obviously unfair.

Now, in attempting to differentiate between these static varieties of lumbar strain and those due to definite trauma, attention should be paid to the following points:

In the first place, the presence of some *static* deformity or disproportion in the lower limbs having been established, the previous history of the case should be carefully analyzed.

Now, if the pains are of static origin, it will be found on inquiry that the backache installed itself very insidiously, and that the pains, though aggravated by the alleged strain, had pre-existed its occurrence by an indefinite period.

Moreover, by judicious examination it will be noted that the pain complained of in the lumbo-sacral region was *diffused* over this area, and not localized to one side or spot, and also that it was clearly very dependent on posture, being relieved by certain positions and aggravated by others.

Lastly, given *bona fides* on the part of the *claimant*, we have the significant fact that after adequate correction of the causal deformity, the pains are either markedly relieved or wholly disappear.

So much for the influence of static or mechanical factors in the production of lumbar strain; and having excluded these sources of fallacy, it now remains for us to consider further means and ways of ascertaining whether any given case that comes under observation is or is not one of genuine traumatic lumbago.

The problem involved is often not easy of solution, but careful attention to the following points should enable us to detect the counterfeit presentment of the malingerer.

Our scheme of investigation should include consideration of the character, and more especially the location of the pain. Moreover, as objective evidences far outweigh in value any subjective statements, we must coincidently note any abnormalities of pose or movement in the lumbar column, and further supplement our observations by radiographic examination.

Character of the Pain.—In respect of the nature of the pain we have no means of distinguishing the fraudulent from the non-fraudulent claimant, but the malingerer is apt to lend himself to excessive protestation as to its severity.

Not seldom, too, he fails to "suit the action to the word, the word to the action," and the shrewd physician will not fail to detect discrepancies between his behaviour and his loud asseverations.

Thus, very frequently *different* movements are subserved by the same muscle, and the malingerer, unaware of this, sometimes betrays himself. Thus, presuming that the results of examination suggest that the supposed lesion is in the latissimus dorsi, the malingerer, though he protests his inability to stand erect, yet nevertheless retains the associated power to depress and at the same time to carry backwards his raised arm, and this, be it marked, without pain.

In the same way, in regard of the erector spinæ he may plead inability or difficulty in rising from a stooping posture, though conscious at the same time of no disability in standing or walking.

The Location of the Pain.—In investigating this all-important point we should always have in mind the old adage: "Deceit lurks in generalities."

The bearing of this is obvious when we reflect that in true traumatic lumbago the pain is invariably referred by the subject to *one and the same spot*—viz., the actual site of the lesion, which, moreover, is always unilateral.

This unalterable fixity in site of the pain, despite all efforts of the physician at distraction or suggestion, is at once the most accurate criterion wherewith to appraise the genuineness of any averred instance of traumatic lumbago. The honest claimant has no need to bethink himself of the site of his pain, for the importunacy of his sensitive organic lesion leaves him in no doubt thereon, whereas the malingerer has to take thought, and herein lies his downfall.

Consequently, when examining a claimant in respect of an alleged subjective claim, the following peculiarities would be suggestive of *fraud*, or at any rate of a *non-traumatic* causation.

Thus, *vagueness or uncertainty as to its actual location* would be very suspicious, and no less a *diffuse or bilateral distribution* of the pain, and as collateral evidence of its non-traumatic origin *the presence of similar pains in parts remote.*

Sometimes, too, the individual in his desire to impress complains also of pains radiating down one or other leg; but on being asked to indicate their course, they are found not to correspond with the pathway of any nerve-trunk—a lack of correlation which is again suggestive of an attempt to deceive.

Again, a malingerer, if unsophisticated, is very open to be played upon, and after being asked to locate the pain with his finger, may often be induced to vary its site by judicious *suggestion.*

But if perchance he be proof against such transparent wiles, we may adopt the plan of blindfolding the person, afterwards requesting him at intervals to point out the exact spot with one finger, and each time the place indicated is marked with a different coloured pencil.

In cases of non-traumatic causation the locality of the pain will be found to vary, whereas in genuine traumatic lumbago there is no shadow of variableness, the pain being persistently referred to the site of the lesion.

Objective Tenderness.—In traumatic lumbago the local sensitiveness, like the subjective pain, is invariably localized to the site of the structural lesion.

Consequently, *inexact or inconstant location of the tender area* in any alleged case of this nature is very suggestive of fraud. That this is so is often made clear almost at first sight, for frequently, if the attention of the claimant can be momentarily distracted, the identical spot that he has just pointed out as being tender may be pressed upon with impunity.

Or the following more subtle test, highly esteemed by some authorities, may be invoked to unmask persons too sophisticated to give themselves away offhand and so palpably.

Thus, it has been ascertained that in the mid-lumbar regions the two points of a compass can only be recognized as distinct stimuli when situated *more than* 2 *inches* apart.

In the mid-sacral region this power of discrimination is only possible when 1½ inches intervene; and in the mid-dorsal region only when the points of the compass stand over 2½ inches apart.

In applying this test the individual is asked to locate precisely the site of the tender spot, which the physician forthwith marks with a coloured pencil.

Subsequently, with the object of distracting the subject's attention, the physician designedly makes a show of being gravely interested in some other region of the patient's body. The examiner, however, afterwards again returns to the neighbourhood of the alleged tender spot, and now fixing on a point *well over* 2 *inches* from that marked by the pencil, searches for tenderness. If now the subject states that this latter is the *only* sensitive area, it will constitute strong presumptive evidence that he is malingering. For in true traumatic lumbago there is only *one* tender spot, and the malingerer gives himself away by marking one spot as sensitive, and afterwards averring that another *over* 2 *inches* distant is the *only* tender spot.

Atrophy and Flabbiness of Muscles.—Wasting of the lumbar muscles, if *unilateral* and marked in comparison with the opposite side, is significant of a traumatic cause, but bilateral wasting, if of equal degree, is unusual as a result of injury.

Disorders of Mobility.—It is often a matter of extreme difficulty for a physician to assure himself as to whether a would-be claimant can or cannot bend his lumbar column without pain, though occasionally in genuine imposters the truth will out on close observation.

Thus, it sometimes happens that a man refusing to return to work on account of alleged traumatic lumbago gives himself away after this fashion. On being asked to bend down and touch his toes, he makes a great show of suffering, but on the examiner turning away forthwith as if convinced of his genuineness, he may be observed to rise up swiftly and without a wince.

Or he may adopt the following more subtle method of imposing upon the physician: On being told to bend forward and touch his toes, he feigns complete rigidity of his trunk, and leaning rather than bending from the ankle-joints, appears, as it were, to be in imminent danger of a fall forwards, much after the pose of a man taking a header while diving.

Such behaviour on his part is always suggestive, if not of pure malingering, at any rate of a wish to exaggerate.

For during forward flexion of the trunk, as we know, the buttock moves automatically backwards by extension in the ankle-joints, in order to balance the weight of the trunk as it inclines forward.

The malingerer hopes to deceive the physician by suppressing this attempt at automatic adjustment, and by thus apparently risking a fall forwards, thinks to convince him of the impossibility of his executing the movement of trunk flexion.

Now, as a matter of fact, it is quite possible for a person to bend his trunk forwards *even if the lumbar column be stiff*, as it can in that case be brought about by *flexion at the level of the hip-joints*.

In other words, we have here another example of the almost invariable tendency of the malingerer to overdo his part, for his manœuvre only discloses his *unwillingness* to bend, and not his inability to do so.

To unveil this attempted fraud, the physician should place the subject on his back, and then seek to ascertain if his hip-joints can be passively flexed. If so, then it becomes clear that the subject is exaggerating his disability, and in so far as the actual movement of *hip flexion* goes he is manifestly malingering. It does not, of course, follow from this that his lumbar spine is not stiff, but it does establish the attempt to exaggerate his disability by *intentional or voluntary fixation of his hip-joints.*

So much for this particular ruse of the malingerer, and now it is necessary for us to pass on to consider by what means we can assure ourselves of the *integrity of the vertebral segments.*

To begin with, if on asking the subject to bend forwards and touch his toes—viz., extreme forward flexion—we note that *the primary movement takes place in the spine*, with secondary movement at the level of the hip-joints, it is unlikely that the vertebræ themselves have been damaged by the alleged injury.

If, on the other hand, this sequence is reversed and *the flexion begins at the level of the hip-joints*, the possibility of more or less severe muscular, ligamentary, or osseous lesions must be canvassed.

The integrity of the actual vertebral segments may be more precisely investigated by the following manœuvre:

The fingers of both hands being inserted between the spinous processes of the different lumbar vertebræ, the patient is asked to stoop and then to slowly raise himself once more to the erect position. In the normal column the projecting spines will be found to separate on forward flexion, while they approximate to each other during extension, and if this be executed freely and painlessly, there is probably nothing in the nature of structural damage at the site indicated by the patient as being painful and tender.

Again, if *the level of the alleged injury* (as estimated by subjective pain and objective tenderness) be located with a pencil-mark, and the behaviour of the spine in anterior, posterior, and lateral flexion be noted, abnormalities or discrepancies may sometimes be detected.

Thus, in *forward flexion* the normal physiological lordosis may only be partially corrected, or the customary projection of the individual lumbar spines may be wholly or partially suppressed, either of which will, of course, be suggestive of an *organic* lesion. Moreover, if these anomalies are restricted to or are more pronounced at the level of the alleged injury, as previously indicated by the subject, it would, of course, be cogent presumptive proof of his *bona fides*.

Conversely, complete replacement on flexion of the normal lordotic curve by the usual kyphosis, with salient projection of the several lumbar spines, will be strong evidence not only of these vertebral segments being undamaged, but also of the absence of any lesion in their related muscular or ligamentary structures.

Again, similar discrepancies may be noted in regard of *lateral flexion* of the lumbar column; it may be restricted to one or other side, and the list of the spine sideways may not begin at the level of the lumbo-sacral junction, but at some higher point.

If such abnormalities can be detected, their existence favours the presumption of an organic lesion in these vertebræ or their associated structures, always provided these findings are clearly

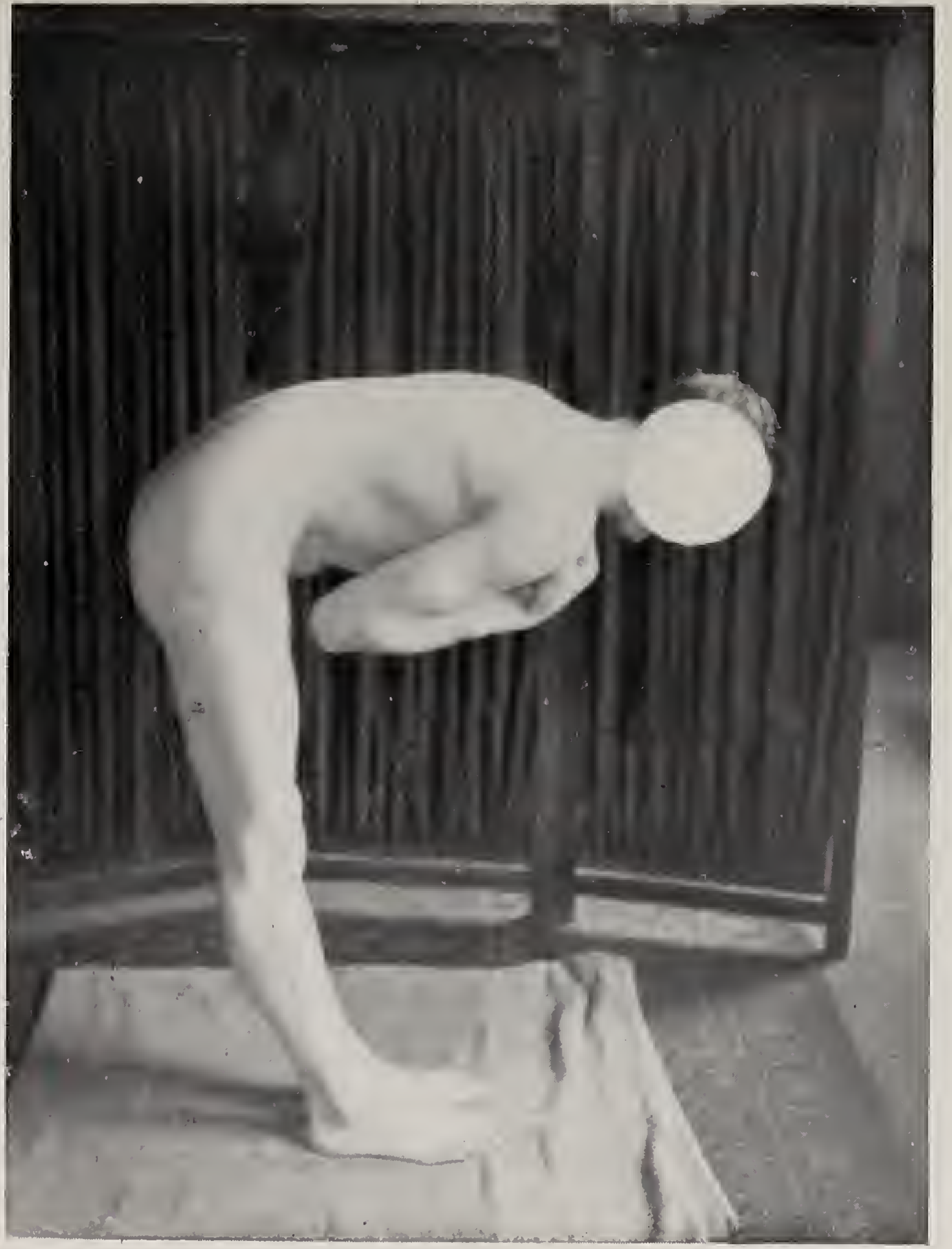


FIG. 120.—Forward flexion of spine, showing automatic backward projection of buttocks and extension of ankles.

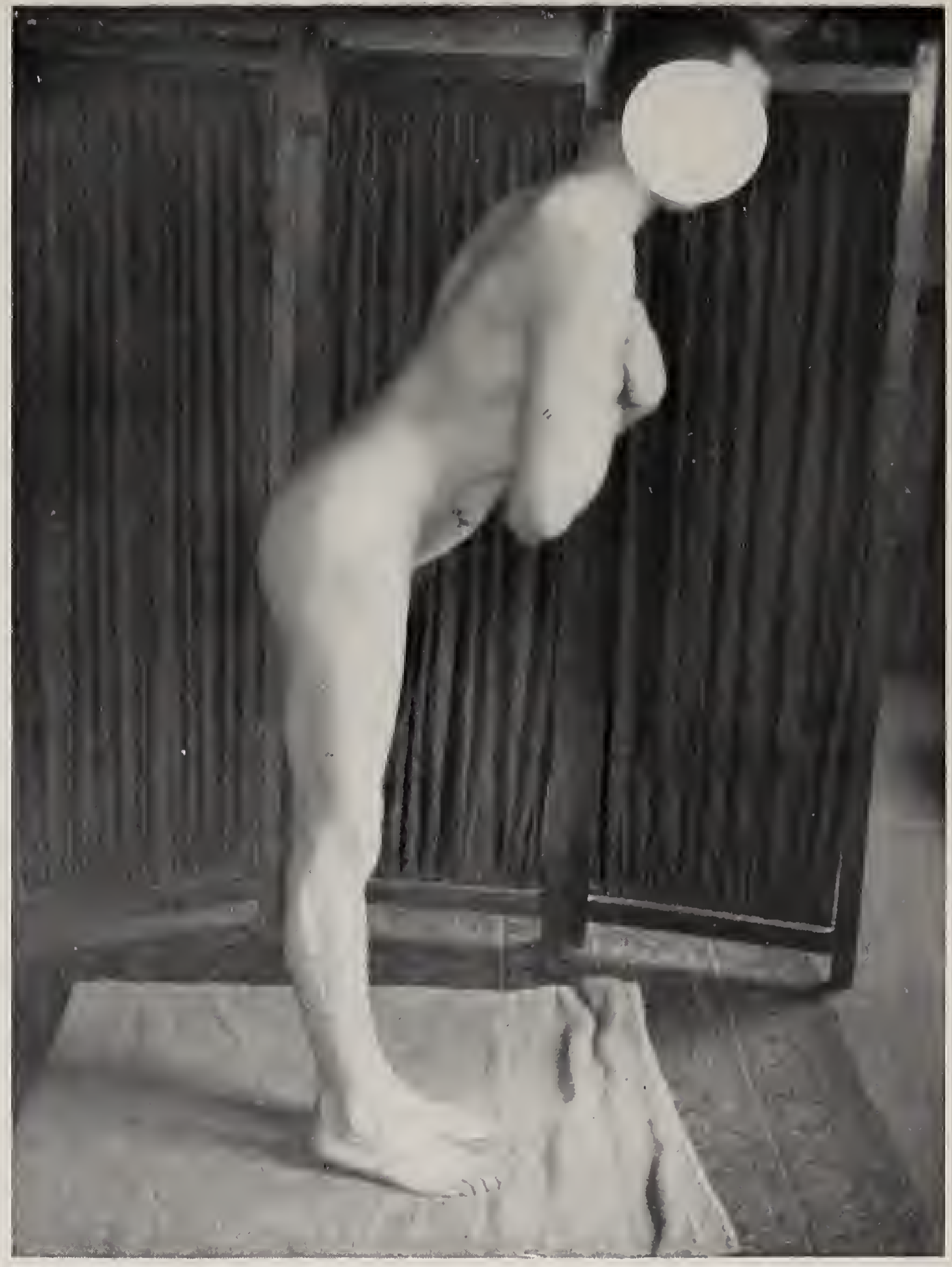


FIG. 121.—Diving position assumed by malingerer in cases of traumatic lumbago.

To face page 620.

compatible with the patient's own statement as to the site of his pain and tenderness.

Thus, for example, let us suppose that the site of the injury, as indicated by the subject, be situated at the level of the third lumbar segment. If, now, on requesting him to bend his spine sideways, it be noted that the lateral inclination of the column begin at a point *below* the third lumbar segment, it will be distinctly suggestive of fraud.

Conversely, if on lateral inclination the lower segments of the lumbar column remain rigid and erect, and the sweep sideways begins abruptly at or *above* the level of the third lumbar vertebra —viz., the site of the alleged injury—it may be taken as proof positive of the existence of structural damage at this level.

Similarly in regard of posterior flexion, any abnormalities in the direction of restriction in the range of normal movement backwards should be noted, and due weight given to any discrepancies that may be observed between our findings and the assertions of the claimant.

In conclusion, it must be admitted that no one of all these various symptoms and signs can be regarded as diagnostic of malingering, and, needless to say, in all instances the results of our findings should be supplemented by *skiagraphy*.

For, as before noted, such serious lesions as *fracture of the transverse processes, the sacrum, and even the fifth lumbar vertebra* may readily be overlooked, and since they may reasonably impair a man's earning capacity, they call for careful consideration, even when there may be reason to doubt the patient's own statement as to the degree of disability they may have occasioned.

Where the skiagraph reveals the presence of osteo-arthritic changes attributed to " injury," we should be chary of accepting trauma as the cause if *several* segments are involved.

In such case the probability is that the disease pre-existed, and the signs of osteo-arthritic changes elsewhere in the peripheral joints would be confirmatory of this view.

If, on the other hand, the bony and cartilaginous changes are found to be strictly limited to *one* vertebra, the likelihood of a traumatic origin is not improbable.

STATIC DISORDERS

CHAPTER XLI

CHRONIC VILLOUS SYNOVITIS

The anatomical and clinical features of this variety of synovial disease were well known to the older physicians, who assigned to it the designation "rheumatic dendritic synovitis."

Subsequently, however, many observers, influenced by the fact that villous hypertrophy is an epiphenomenon common to divers arthritic diseases, refused to acknowledge its claim to be regarded as a clinical entity.

As a consequence of this attitude, most modern textbooks omit any special reference to the disorder, though its distinctive symptomatology may be discerned under the clinical descriptions of osteo-arthritis and other joint diseases.

But of recent years, in the more severe examples of villous arthritis, resort has been frequently had to an arthrotomy, with the object of removing the enlarged fringes, and so relieving the troublesome symptoms directly due to their mechanical interference with the free-and-easy movement of the joint. Incidentally, too, such operative procedures have revealed the fact that not only is papillary overgrowth a very common synovial abnormality, but it is apparently often the sole anatomical change that can be distinguished.

Accordingly, many authorities are now inclined to reinstate this condition of chronic villous synovitis in its original position as a definite joint disorder.

But, while acknowledging the legitimacy of its claim to clinical individuality, we would dissociate ourselves from those modern writers who, in describing fibrositis or "chronic rheumatism," would include this particular joint affection as one of its manifestations.

To our mind, there is nothing in the life-history of the disease that would justify such an assumption, and what is perhaps more incomprehensible is the fact that one variety only—chronic villous synovitis of the knee—should have been affiliated to the "rheumatic" category.

Etiology.

The causes of villous hypertrophy are many and diverse. Thus, it is very common in *rheumatoid arthritis*, in which event its distribution is *polyarticular*, and the enlargement of the villi presumably due to infective or toxic processes.

It has also been seen in connection with *syphilitic, tuberculous*, and other *infective arthritides*, but with these, as well as the rheumatoid variety, we are not here concerned. Nor need we do more than allude to those instances due definitely to direct *injury* or some *internal traumatism* through a loose body or detached cartilage.

The particular group we wish to draw attention to is that in which a villous change appears to be the outcome of long-continued strain through some *static disturbance* in the lower limb which results in an erroneous deflection of the body-weight.

Thus one *knee* may undergo this change in sequence to a weak, flat, or pronated foot on the same side; but in other instances the effect of the mechanical or static deformity in the foot is transferred, not to the knee, but to the *hip*, where a similar villous hypertrophy develops.

The occurrence of this eventuality in the case of the hip seems in some obscure way to be favoured by a previous injury, for in these cases of villous synovitis of the hip, almost invariably *monarticular*, we have on careful inquiry into the past history been able to elicit with remarkable uniformity the occurrence of *trauma*, a sprain, a blow, or a fall, on the great trochanter, though very frequently of remote date.

But in addition we have been struck by the fact that there was almost always present in the same limb a flat foot, inequality in the length of the limbs, or other factors calculated to throw increased strain on this articulation.

That villous changes often develop in the knee-joint is well recognized, but that a similar condition may arise in the hip seems to have been overlooked, and this we suggest may be due to the fact that this latter articulation is deep-seated, and less accessible to direct examination than the knee.

The *knee*, of course, is the commonest site of the affection, and unless of definitely traumatic origin it is usually *symmetrical*, and attributable to indirect strain on both articulations through some common factor—*double flat-foot, double knock-knee, bilateral genu varum, or some pelvic abnormality*.

Its predilection for the knee is doubtless due to the fact that by reason of its weight-bearing function this articulation is extremely liable to strain, while its intrinsic anatomical complexity of course renders it more facile of derangement.

Thus, for example, villous synovitis commonly develops in both knees in those women at or about the menopause, in whom the plantar arches have sunk in sequence to sudden and substantial *increase in body-weight.* Occasionally, and for the same reason, the villous change makes its appearance in women recently confined, and sometimes in adults showing *deficient muscular and ligamentary tone.*

In these latter there is generally widespread evidence of this lack of muscular inefficiency, as shown, not only by flat feet, but also round shoulders, sagging of the lower part of the abdomen, and so forth, and the knee is presumably also a local manifestation of the general laxity of the tissues.

In regard of all the foregoing factors, it is clear that their etiological importance resides in the fact that they involve *erroneous deflection of body-weight*, and therefore persistent strain on the lower extremities.

Now, when dealing in a previous section with the differential diagnosis of pains in the lower limb, we saw how extensive a rôle was played by *static deformities* in their production. It was shown, for example, how the *secondary* pains of a flat foot might be referred to the *knee*, *hip*, or *lumbar region ;* but at this juncture we would emphasize the fact that their ill effects may not be confined to merely *subjective* symptoms.

For undoubtedly, if uncorrected, such static foot errors may pave the way for the development of definite *anatomical* changes, not only in the foot, but also in the knee-joint, hip, or parts even more remote.

The intricacy and no less the importance of the static relationships in the lower limb demand, however, a brief digression, as failure to appreciate their significance is responsible for, possibly, the gravest diagnostic errors that occur in the sphere of so-called chronic rheumatism.

Mechanism of Lower Extremity, and its Bearing on Pathogeny.

If it be realized that the foot, leg, thigh, and pelvis constitute what may be termed a *static unit*, it will be seen that any mechanical defects in the foot or other parts will be propagated throughout the other segments.

To take an architectural analogy, the lower limb may be regarded as an insulated column, composed of four parts, supporting a superstructure—the trunk or body-weight. If now the plinth or base of the column subsides or is displaced, a static alteration ensues, whose effects extend throughout the various parts of the superstructure. In the same way, if the basal segment of the lower extremity—the foot—becomes inclined, as in the *weak*, *pronated*, *or flat foot*, the resulting static disturbance is diffused throughout the component parts of the static unit.

Thus, a flat foot may produce secondarily a condition of genu valgum, and this, again, may lead to articular incongruence between the head of the femur and the acetabular surface, and so the pernicious effects of the primary deformity in the foot may ultimately be experienced in the pelvis or lumbar column.

We have taken flat-foot as an example, but it is clear that whether the knee, hip, or pelvis itself be the site of the primary static derangement, the compensatory displacements will extend throughout the related segments.

Thus, in *genu valgum* the normal slight inclination of the femur inwards will be exaggerated, and incidentally the head of the femur will be forced out of its normal coaptation with the acetabulum, its altered position approximating to that of a coxa vara. Nor is this all, for at the same time, too, the lower leg or tibia undergoes outward rotation, and a similar compensatory displacement will occur even within the tarsal joints.

A similar static disturbance may originate in the *pelvis* when, through some peculiarity in its conformation, the normal articulation with the head of the femur undergoes alteration, and the effects of such articular incongruence are in the same way transferred to the knee, and even to the foot.

Enough has been said to show the mutual *static interdependence* of the component parts of the lower limb, and it now remains for us to consider how such may promote or favour the occurrence of villous overgrowth.

As to the *modus operandi* of flat-foot in causing *bilateral villous synovitis of the knee-joints*, we would put forward the following explanation: The everted foot, with its sunken arch, as before stated, determines an alteration in the normal coaptation of the articular surfaces in the knee, and this incongruence is revealed in skiagraphs by the marked prominence laterally of the external tibial tuberosity beneath the external femoral condyle.

Coincidently, and for the same reason, additional strain is thrown upon the internal lateral ligament. This in turn favours a state of passive congestion or hyperæmia of the synovial membrane, which becomes relaxed and thrown into folds, especially at its reflexions near the edges of the cartilages.

If, as often happens, the individual is the subject of *varicose veins*, or suffers from a general *lack of tone in his muscular or* *ligamentary structures*, this tendency to venous engorgement of the knees is much enhanced.

Under the influence of these mechanical factors and their associated circulatory disturbances, *thickening and enlargement of the synovial fringes* ensue. The inflammatory condition thus produced tends to increase automatically, as owing to the articular incongruence, the enlarged fringes are very prone to become caught between the joint surfaces; in other words, a vicious circle is produced, as with the increasing villous hypertrophy the liability to internal traumatisms increases *pari passu*.

It is possible, also, that the mere mechanical effects of *articular incongruence* may be directly responsible for the production of fringe hypertrophy. Thus, Haggenhorn and Schuller, while noting the presence of synovial fringes in certain portions of all normal joints, observed also that atrophy of the fringes occurred in parts of the joints subjected to pressure from the articular bony surfaces.

In other words, where the interosseous pressure was least marked, the overgrowth of fringes was the more pronounced.

Sokoloff, discussing the foregoing observations, finds them in accord with his own findings in old and *non-reduced* dislocations of the femoral head. He found that in such a marked overgrowth of synovial fringes was present in the dilated upper and outer part of the capsule, this portion, mechanically speaking, being out of action or non-functioning. Taking these findings in connection with those of Schuller, he was inclined to consider that any pathological *decrease in the normal conditions of intra-articular pressure* was sufficient to initiate local overgrowth of the synovial fringes, and this without any intervention of an inflammatory process.

Apart from such definite luxations, there is reason to believe that for similar reasons villous proliferation may occur in the *hip-joint* as a consequence of the minor displacements which occur in this articulation as a result of flat-foot, genu valgum, or pelvic abnormalities.

For in their presence the articular surfaces of the hip-joint, which normally are congruent, become incongruent. Incidentally, the capsule and ligaments of the joints are subjected to constant slight, though persistent, torsion and strain. As a consequence of this, as well as the altered interosseous pressure, the underlying synovial membrane becomes irritated, and numerical increase and hypertrophy of the fringes ensue.

In attempting thus to ascribe villous disease to altered static relationships, we are supported by analogies drawn from the lower animals. Most veterinarians agree that both *bog and* *bone spavin* are more prone to occur in horses with very upright or very crooked hocks. The true hock-joint is homologous with the tibio-astragaloid articulation in man, and any lateral deviation in it from the perpendicular line—*by deflecting the body-weight erroneously*—becomes a source of weakness, and therefore of disease. Not only does the actual conformation of the hock itself predispose to spavin, but defective formation of other joints statically related to it exerts a like effect; hence the frequency with which hock disease develops in animals with too straight fetlocks or stifle-joints. Comparably, too, with what occurs in the human subject, we find it prone to develop in young overgrown horses, or those put to carry too heavy a load, and for the same reason it is said to be common in brood mares.

Lastly, even as in man improper foot-gear leads to flat-foot, and thus to villous synovitis, so in horses one fertile source of spavin is said to be alteration of the direction of the leg, brought about by the use of high-calkined shoes. The analogy between spavin and villous synovitis seems a fair one to draw, as, at any rate in the bog or bursal variety, *villous enlargement* and effusion are characteristic changes.

Morbid Anatomy.

The synovial membrane undergoes the following changes: it becomes more hyperæmic, the fringes hypertrophy, and fresh villous appendages make their appearance.

As a rule the synovial membrane undergoes less thickening than in ordinary "rheumatic synovitis," but there is greater tendency to fluid effusion. On its inner surface are to be seen sprouting a number of arborescent growths, which in appearance closely simulate clusters of chorionic villi. The numerical increase and hypertrophy of the fringes may proceed to such an extent as to merit the term "chronic villous arthritis."

The minute alterations in the synovial membrane have been made the subject of special study by Hoffa, Painter, Erving, and others, and in the production of the condition *two* stages may be distinguished.

The first is characterized by villous overgrowth and proliferation of the fixed connective-tissue cells, with extensive pigmentary deposits. These latter are of a dark brown hue, and localized partly extra- and in part intra-cellularly. Incidentally new bloodvessels make their appearance in moderate number, with scanty perivascular leucocytic accumulations.

In the later stage of the disease, however, degenerative changes predominate, and the synovial membrane undergoes mucous and hyaline transformation. Hoffa considers this ultimate and occasionally complete change of the synovialis into structureless hyaline tissue to be characteristic of the affection.

Painter, who has operated extensively for this condition, found the following characteristics in a cross-section of one of the excised synovial tufts. The cortex was composed of fibrous tissue containing many small round cells, while the medulla consisted of connective-tissue cells, staining well in some places, in others showing no nuclei.

Aggregations of fat cells occupied much of the remaining space, through which coursed many vessels with thickened walls, and in some instances obliterated lumina. In other words, an *endarteritis* of obliterative character is instituted, and in consequence of the deficient blood-supply the newly-formed tissues undergo degeneration or disappear, their place being largely taken by adipose deposit. The further course of these cases tends in one of three directions:

Sometimes cartilaginous bodies form in the enlarged and fatty fringes, and subsequently through detachment of their pedicles become free in the articular cavity. Or, on the other hand, great distension and enlargement of the synovial sac may ensue, leading to one form of *hydrops articuli*.

Lastly, in long-standing cases marginal *bony outgrowths* may be found studding the patellar and condylar surfaces.

CHAPTER XLII

VILLOUS SYNOVITIS OF KNEE

Clinical Account.

Its *mode of onset* is insidious, the symptoms supervening gradually, the patient scarce knows when or how.

How unobtrusively the villous change may be installed is shown by the fact that frequently in persons, the subjects of flat feet, loud crepitation is to be elicited in the *knees,* though no pain or discomfort is referred to these articulations.

Subjective Symptoms.

The initial complaint is as a rule of *stiffness,* but in some instances the patient is distressed more by a sense of weakness, distension, and unreliability. The stiffness is most noticeable in the morning or on rising from a chair after a prolonged sitting. Hence they commonly choose lofty seats, from which they find it easier to disengage themselves.

Site and Character of Pain.—When at rest pain is not ordinarily present, but it is evoked by long standing or walking. Sometimes a sharp pang may be felt, which radiates to the ankle along the shin-bone, and this, though usually temporary, may be persistent.

In some instances the pain is referred to the under-surface of the patella, or to the site of the internal lateral ligament, which often is tender to pressure.

In others with marked lipoma arborescens the pain may be severe after exercise, not ceasing even with rest, and sometimes worse at night, necessitating frequent alterations in position.

The pains, though they may be aggravated by change of weather, are frequently uninfluenced by it, but in women they are often worst just prior to the onset of menstruation.

Obese subjects suffer, undoubtedly, more than lean, and especially in the presence of *varices in the lower extremity.*

The symptom, however, that is most distinctive of the affection is a disagreeable sensation of something having intruded just between the articular surfaces. It usually occurs during walking, and is at first only occasional, causing slight transitory lameness. But as the villi become harder and more pedunculated, they tend to act with increasing efficiency as foreign bodies, and the *pseudo-locking* becomes more marked, and ensues more frequently. Though they may be severe, and cause the patient to fall owing to the sickening pain, yet as a rule they never reach the dramatic intensity typical of loose bodies or a slipped cartilage.

Before passing to the objective signs of the affection, we would emphasize the probable *static* origin of the pains. This is distinctly suggested by the fact that they are rarely present during rest, and are only evoked when walking or standing.

Moreover, the pain, including that resulting from nipping of the fringes, wholly ceases when the *causal flat-foot* is adequately corrected.

Objective Phenomena.

Generally speaking, no actual limitation of the range of movement of the joints is present. Only in cases where the villous formation is excessive is there any limitation, and that usually in the direction of *extension.* Sometimes, however, flexion, though unrestricted, gives rise to pain when carried to the extreme.

In the initial stages examination may reveal nothing abnormal in the appearance of the affected articulation. Despite, however, the absence of apparent alteration, if pressure be made with the finger on either side of the patella, the enlarged fringes may be detected. If during the manipulation the soft parts be moved up and down on the underlying bone, knots or nodules may be clearly distinguished, the facility depending on the degree of effusion which is present at the time.

Moreover, if the palmar surface of hand and fingers be closely applied to the surface of the articulation, a peculiar soft silken *crepitus* will be heard and felt as the patient alternately flexes and extends the limb.

It more or less closely resembles the rustle produced when two folds of stout and stiff silk are rubbed one against the other. It wholly differs from the creaking sound elicited in simple *chronic synovitis with thickening.* In such a case, when fluid is absent, the hard and roughened synovial folds, as they pass over each other, emit a noise similar to that produced when two portions of calf leather are drawn firmly and closely over each other.

Lastly, we should beware of confusing the crepitation of villi with the definite crunch heard when *eroded cartilaginous surfaces* pass over each other, and at the same time from the harsh and grating noise that ensues when the ends of the bones are actually denuded. In differentiating these various joint sounds, *auscultation* of the affected joints, as Dr. Garrod has pointed out, is of great assistance.

To resume, the synovial fringes, as before pointed out, occasionally become nipped, and nothing is more distinctive of villous synovitis than the *recurring synovial effusions* which follow such internal traumatisms.

In the more acute forms all the surface depressions may be wiped out through the distension, but generally speaking the effusion is moderate in degree. With the continued growth of the fringes, the contour of the joint becomes visibly altered, and a fulness is detectable on either side of the patellar tendon. Sometimes behind this structure a marked thickening may be felt, which is often tender to pressure.

When the villous formations are very extensive, the joint assumes a rounded character, and the patella may appear to float, giving at the same time a spurious sense of fluctuation.

Such widespread papillary growth takes place gradually, first appearing on the sides of the patellar tendon, afterwards on the inner and outer sides of the knee, and eventually invades the popliteal space and upper joint recess.

The condition, in our experience, being almost invariably associated with *double flat-foot*, it tends to steadily progress unless the static foot error is corrected. If adequate adjustment be secured, the large villi apparently undergo shrinkage, nipping of the fringes ceases to occur, and the pain and disability disappear.

Obesity in many instances is an aggravating factor, and the prolonged course of many cases is entirely due to insufficient appreciation of its mechanical effect on the joint disorder.

For with the increase of their body-weight more and more strain is thrown upon the flattened feet, and so the secondary villous change in the knees proceeds apace.

Extensive *varices in the lower extremities*, too, exert a most unfavourable influence, favouring as they do the tendency to hyperæmia and engorgement of the synovial membrane.

Under such circumstances the course of the disease will depend very largely upon how far this adverse influence can be corrected by special measures.

In neglected cases undue *laxity of the ligaments* may ultimately ensue, through the tension produced by the constant recurring effusions which follow nipping of the fringes, but this is a rare complication. What generally happens is that, failing detection and treatment for the static foot error, *marginal exos-*

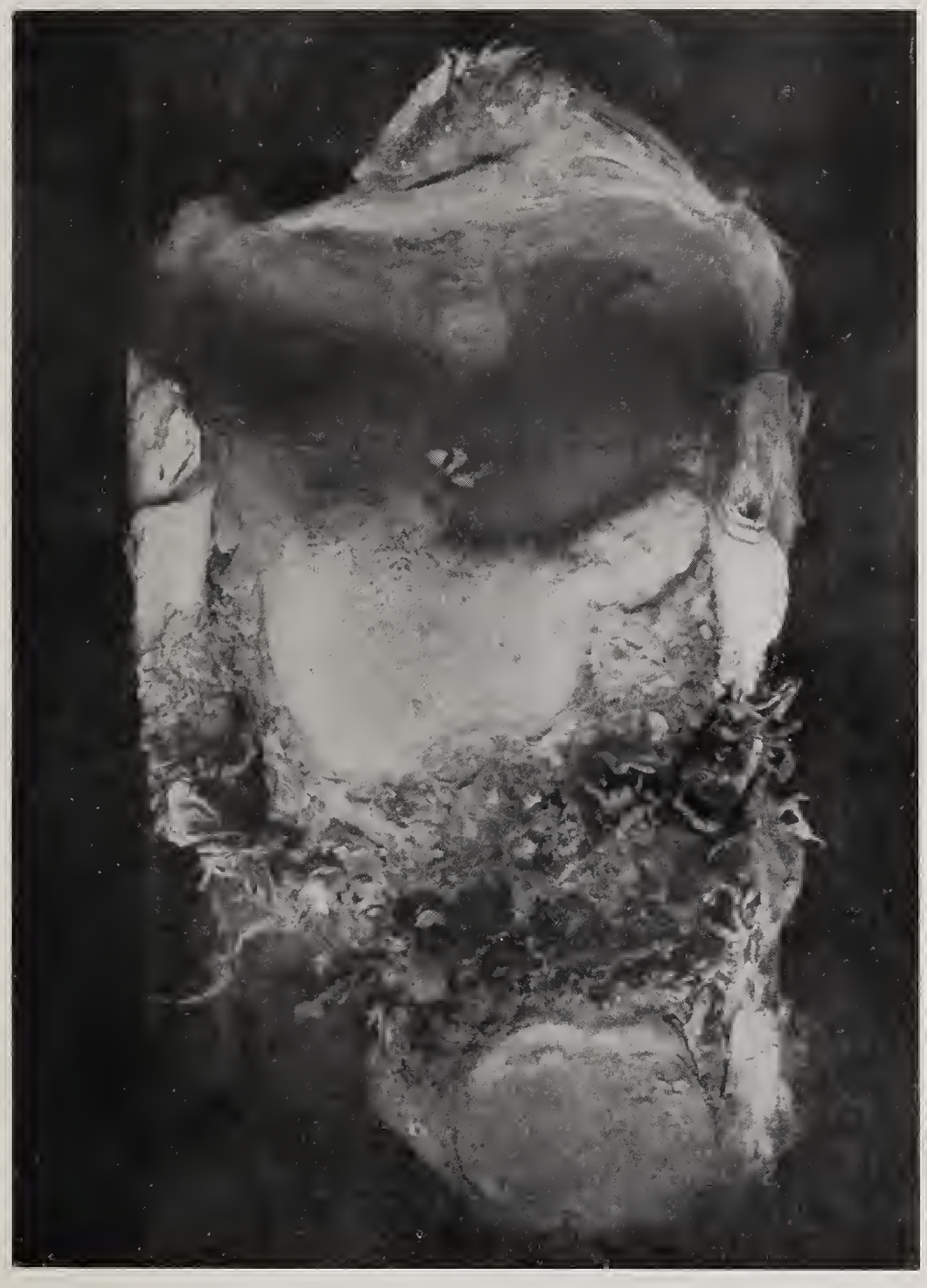


FIG. 122.—Knee-joint, showing hypertrophy of synovial villi. (R. C. S. Museum.)

To face page 634.

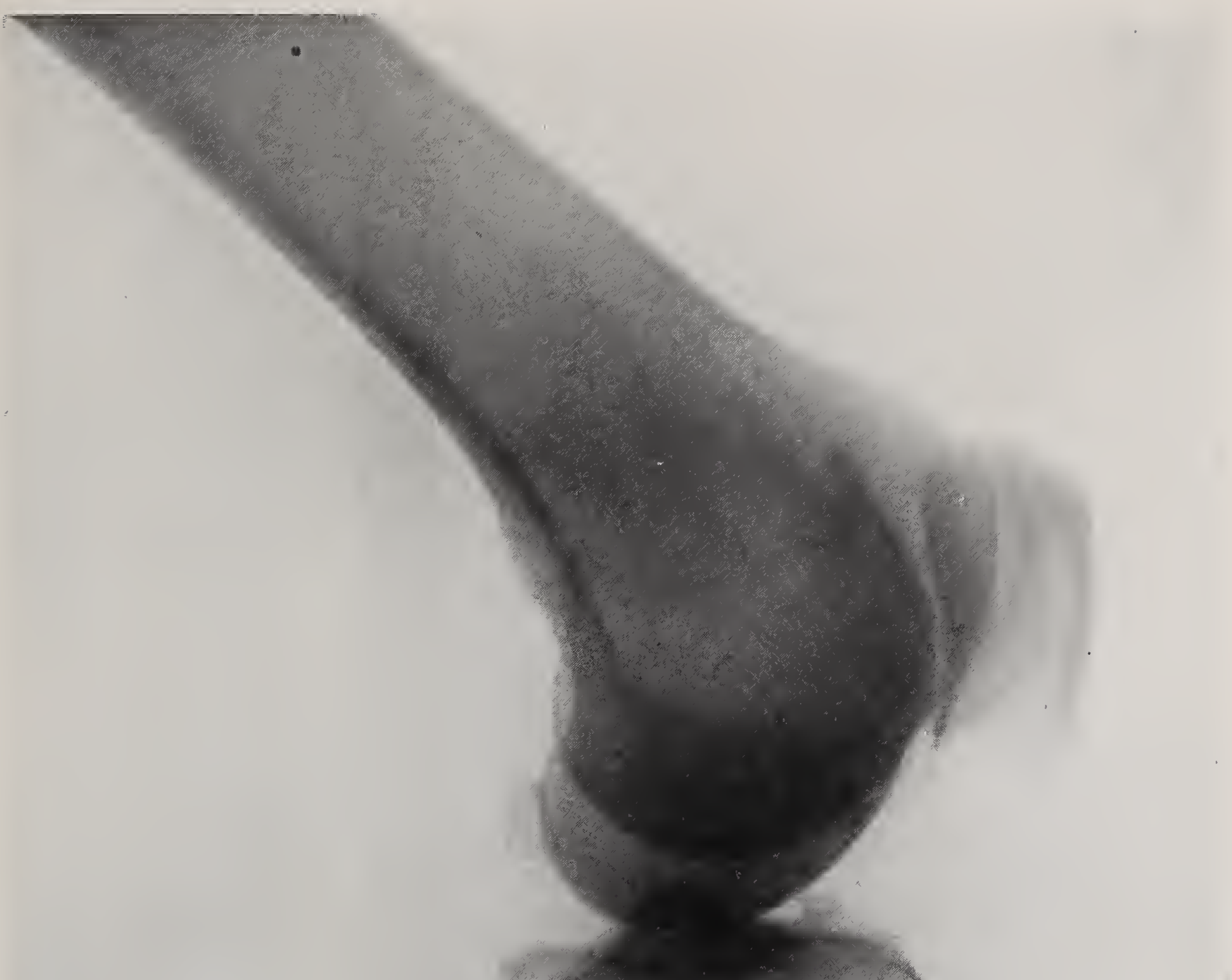


FIG. 123.—Skiagram of osteo-arthritis of knee, showing lipping of patella and anterior part of articular surface of tibia, with an osteophyte behind femoral condyle. (? Calcified fringe.) Note the sesamoid bone, commonly seen here, lies farther behind the femur.

To face page 634.

toses eventually appear, studding the borders of the patella and the edges of the tibial and femoral condyles.

Here we may allude to the fact that but too commonly the term "osteo-arthritis" is applied to these cases of villous hypertrophy, and this when there are no bony outgrowths present to justify its application.

Personally we have found that, if examples of this nature are as a matter of routine subjected to skiagraphy, it is astonishing how seldom, comparatively speaking, new bony formations can be detected, and we would indeed emphasize the extraordinary length of time which may elapse before they develop. Years may elapse before bony outgrowths can be detected, and even in instances in which the disease appears to have arisen simultaneously in both knees osteophytes may be present in the one articulation, and yet absent in the other.

Skiagraphy.

Radiographs taken of the joints will, of course, afford us no evidence of the presence of enlarged villi, for detection of which we have to depend on physical examination.

But in support of our view that the changes in the knees are of static origin we have the fact that, even in the very earliest stages, evidences of *articular incongruence* may be obvious.

Thus, if we examine the skiagraph of a normal knee, it will be seen that the margins of the femoral condyles, if prolonged downwards, fall *within* those of the tibial tuberosities; in other words, the joint surfaces are congruent. At the same time it will be noted that the shadow thrown by the fibula lies *external* to that of the tibia.

Now, as a consequence of everted and flat feet, the leg undergoes outward rotation, and so a state of anatomical incongruence results in the knee-joint. The rolling outwards of the leg is shown by the fact that the shadow of the fibula, instead of lying externally, falls *within*, or is hidden by, that of the tibia.

The articular incongruence, on the other hand, is revealed by the altered relation of the tuberosities of the tibia to the condyles of the femur, the external tibial tuberosity projecting markedly *beyond* that of the external femoral condyle.

The significance of these findings may be gleaned from the like changes which ensue in *flat-foot*, concerning which condition there can be no doubt as to its being essentially a *static* disorder. In X-ray photographs of flat and pronated feet we see revealed a similar articular incongruence, as manifested by a projection of the head of the astragalus and a sinking on the part of the scaphoid bone, which articulates with it. The close and even coaptation of the astragalo-scaphoid surfaces is broken by the abnormal depression of the scaphoid, and so there results a partial uncovering of the articular surface of the head of the astragalus.

A similar incongruence is often noted in early stages in the articulating bones of the *tarsal* joints, which lose their normal intimate coaptation, and exhibit marked separation or gaping of their intra-articular spaces.

In advanced cases of flat-foot it is significant, too, that *osteophytic formations* most commonly make their appearance on the margins of the astragalus and scaphoid, which seems significant of an attempt on the part of Nature to compensate for the articular incongruence.

In the same way in the knee-joint the margin of the *external tibial tuberosity* is a favourite site for the development of bony outgrowths.

Diagnosis.

In our clinical account we have confined ourselves chiefly to symmetrical villous synovitis, and when thus localized there is little danger of misapprehension if the history and local signs be carefully considered.

In regard of the first point, careful inquiry should be made as to the incidence of *trauma*, for, though as a rule cases following injury are *monarticular*, it sometimes happens that the ligaments of both knees may be simultaneously strained or wrenched, and the papillary change therefore bilateral.

This being disposed of, we should ascertain the existence or not of *double flat-foot*, knock-knee, or other static deformities, noting also whether varicose veins are in evidence.

As contributory factors, we should not miss the significance of a *recent pregnancy*, *suddenly-developed obesity*, or a *faulty postural attitude*, indicative of lowered muscular and ligamentary tone.

Local Symptoms and Signs.—The onset is gradual and insidious. Stiffness is the salient symptom. Pain is slight or absent, save when during walking "pseudo-locking" occurs. Mobility is usually unimpaired; if limitation be present, it is the power of full extension that is usually restricted.

Swelling is either general or localized to the supra- or infrapatellar region. Recurring effusions are very common and constitute a distinctive feature. On palpation, enlarged fringes are to be felt, with sometimes local tenderness. Peculiar crackling is heard on flexion or extension of the joint.

The diagnosis should not be considered complete without *skiagraphy* being undertaken to reveal or exclude osteophytic

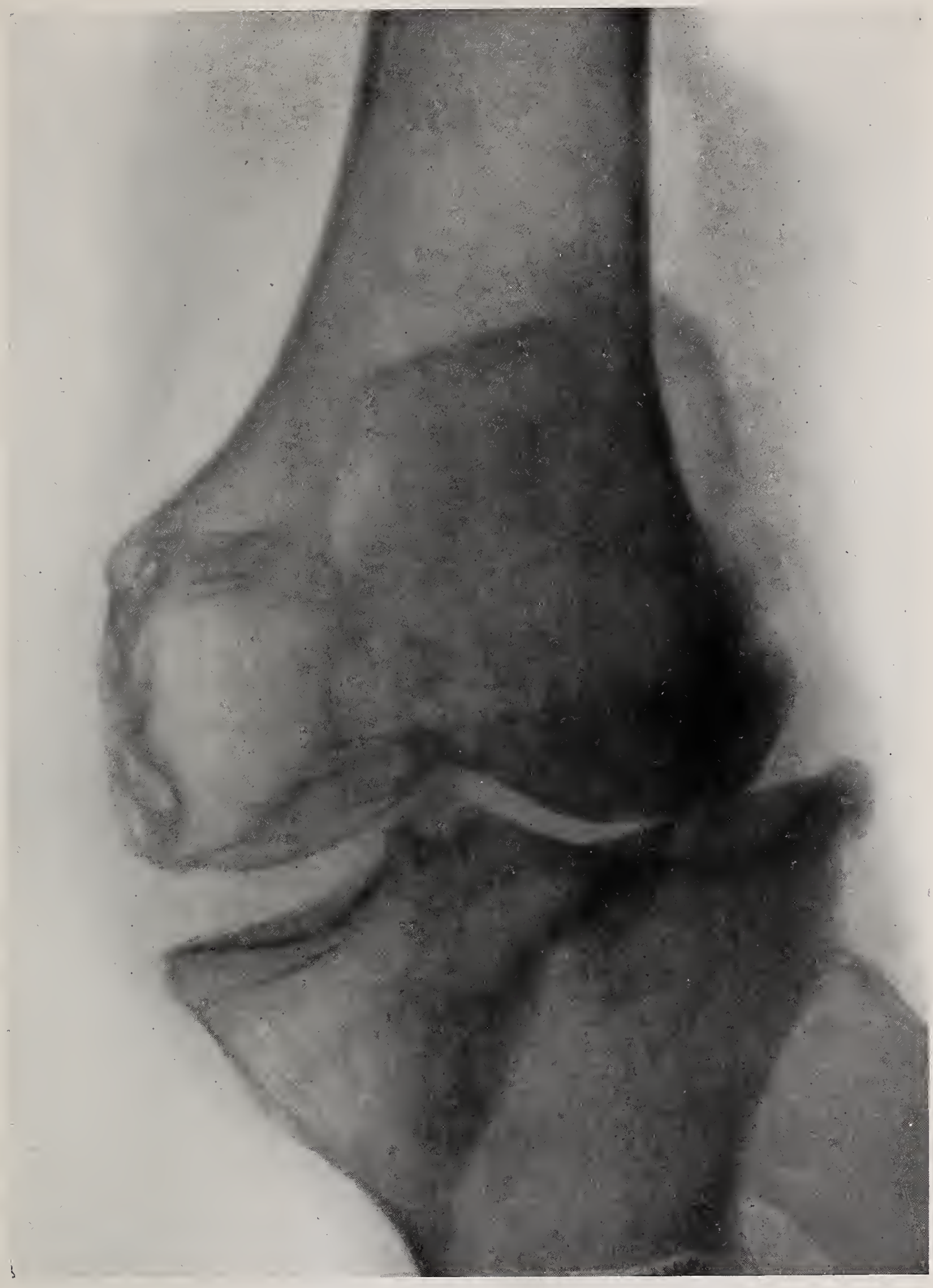


Fig. 124.—Skiagram of osteo-arthritis of knee, showing marked lipping of outer margin of articular surface of tibia and absorption of external articular fibro-cartilage, the surfaces of external condyle of femur and tibial tuberosity being close together. Note the articular incongruence.

To face page 636.

outgrowths. At the same time, the radiographs should be scanned for evidence of articular incongruence, as shown by altered relationship of the femoral and tibial condyles, and masking of the fibular by the tibial shadow.

Differential Diagnosis.

Osteo-Arthritis of the Knees.—The subjective symptoms and signs of early osteo-arthritis are practically identical with those of villous arthritis, and, although the presence of osteo-arthritic lesions elsewhere would be suggestive, skiagraphy alone will enable us to effect a differentiation with certainty.

Rheumatoid or Atrophic Arthritis.—This disorder is frequently accompanied by villous hypertrophy, but the condition is never localized to the knees, neither does it begin in these articulations. It is always *generalized*, affects the peripheral joints first, and is attended by muscular wasting and other collateral phenomena absent in simple villous synovitis.

Bilateral Hydrarthrosis.—Passive effusion into the knees of *infective* nature may readily be confounded with villous synovitis.

For the onset of such cases is insidious, while the subjective symptoms are slight. Moreover, they are usually *symmetrical* and unattended by thickening of the capsule, and the interference with mobility is only such as is imposed by the amount of fluid.

The common causes are *gonorrhœa, syphilis, and tubercle*, and inasmuch as such infective forms of hydrarthrosis may be attended by *villous proliferation*, the likelihood of confusion is not remote.

Accordingly, where the effusions are *passive, copious*, and *persistent*, rather than recurring, then their possible infective origin must be carefully considered.

In gonorrhœa the history or existence of a urethral discharge, together with the detection of the gonococcus, while in syphilis the existence of other lesions, the response to Wassermann's test, and specific treatment, will be the points on which to rely.

In regard of tubercle, we have to reckon with those aberrant forms associated with the name of Poncet, as the synovial change produced by this modified or attenuated variety of tuberculous infection is sometimes betokened by bilateral hydrarthrosis of the knees.

The diagnosis will rest upon the detection of visceral foci, usually of fibroid character, and the sero-reaction.

Intermittent Hydrarthrosis.—This affection is slightly more common in females. It may complicate gonorrhœa or other articular affections, or be associated with epilepsy, migraine, giant urticaria, or Graves's disease.

It is characterized by sudden swelling from effusion, while the pain produced is slight, or may be wholly absent. The incidence of the swelling is strictly *periodic*, and the length of the cycle varies in different individuals.

Perisynovial and Peribursal Gummata.—These are sometimes a source of confusion, affecting as they do commonly the knee-joints of middle-aged adults, especially women.

The synovial swelling is nodular and uneven. Pain is slight, and mobility but little impaired. The identification will depend upon the history, the detection of specific cutaneous lesions, the presence of scars in the neighbourhood of the knee, and the quick response to antisyphilitic remedies.

CHAPTER XLIII

VILLOUS SYNOVITIS OF HIP

Clinical Account.

THE manifestations of this disorder are both subjective and objective, but for their detection our examination must be conducted with that same meticulous care we are wont to exercise when searching for the early symptoms and signs of *tuberculous* hip disease.

Collectively they consist of pain, tenderness of hip, and alterations in attitude and gait, with limitation of mobility.

Subjective Symptoms.

Pain being the most prominent, we must, for its accurate interpretation, be thoroughly conversant with the intimate nerve-supply of this great articulation, which receives branches from both the *lumbar and sacral plexuses.* Thus, from the anterior crural a branch runs to the anterior portion of the capsule, the posterior part of this structure being innervated by the sacral plexus and sciatic trunk, while the lower and inner part of the capsule derives its nerve-supply from the obturator, which also sends a twig to the ligamentum teres.

Site of Pain.—It may be—(1) localized to the hip region; (2) referred along one or all of the nerve trunks from which the articulation derives branches.

Articular Pain.—Just as in the knee, a feeling of pain, or rather a feeling of painful stiffness, is felt in the joint itself. The sensation is most often localized *deep in the groin,* as if situate in the anterior part of the capsule. Or it may be referred to the posterior aspect of the hip near the small trochanter, but very commonly it is situated in the neighbourhood of the great trochanter. At the last-named site it is often deep-seated, and apparently located in the external rotator muscles, which, through the forced eversion that ensues so early in the disorder, become probably overstrained.

The articular pains, at any rate in the early stages, are not constant, and, as in the knee, *periodic* attacks occur with precisely the same feeling of something having intruded between the articular surfaces, which prevents the easy working of the joint.

The sudden hitch thus produced gives rise to a stab of pain, so that the patient is brought up sharp, and walks lame maybe for some hours. More commonly, however, the pain goes as suddenly as it comes, the intercepting fringe having happily become disengaged from between the opposed surfaces. (Apart from walking, such incarceration of the fimbriæ may occur during turning in bed.) With the growth and numerical increase of the villi such attacks ensue more frequently, and, *pari passu*, the stiffness and disability become increasingly troublesome.

Local Tenderness.—Sensitiveness to palpation of the capsule of the hip is a very constant sign, but careful examination is necessary to elicit its presence. In some it is more easily detectable on the anterior surface of the joint when the finger is pressed deeply into the groin, and with it is often associated some periarticular thickening. In others this feeling of tenderness, with increased density and resistance, is more readily elicited on its posterior aspect, behind the great trochanter.

The localizing value of this *joint pain and tenderness* far exceeds that attachable to the referred pains, which may be, and indeed so often are, attributable to other and *extra-articular* causes.

Referred Pains.—Though relatively of less importance, yet it is highly desirable that we should not misinterpret their significance; for it is undeniable that more often than not their articular origin is overlooked, and they are dismissed as examples of pure sciatic or crural neuralgia.

So it happens that they usually pass as being of " gouty or rheumatic " nature, and the unhappy victim for years or even decades wanders from spa to spa in search of relief.

The fact, too, that for the time being their pains, either spontaneously or under the influence of hydrotherapy and so forth, do undergo remission, fosters the belief in their idiopathic neuralgic nature. But if retrospectively analyzed, it will be found that the relief obtained was but short-lived, and that their pain and disability swiftly and invariably recurred.

In this way only too frequently the misapprehension as to their nature continues, until the limitation of mobility becomes so obtrusive as to leave no question of the articular site of the morbid process.

Paths of Distribution.—Very commonly the pain begins at the small trochanter, and shoots down the obturator nerve along the inside and front of thigh to a point at or near the knee. Indeed, in some instances the disorder in the hip may manifest itself solely by pain referred to the *knee*.

In other cases it is more deep-seated, darting through the gluteal muscles and those along the front of the thigh which are innervated by the anterior crural. Again, but not more often, it is transmitted along the sciatic down the back of the thigh, or, instead, is referred to the peroneal region, or through the posterior tibial nerve to the back and inside of the knee. Lastly, it sometimes passes down the external cutaneous nerve on the outer side of the thigh, constituting a variety of so-called "meralgia paræsthetica." Apart from mere pain, various paræsthesiæ, tingling, numbness, and formication, may be experienced along these various paths of nerve distribution.

In regard of intensity they display wide variation, and more commonly they weary rather by their persistence than their acuteness.

Now, as regards the diagnostic importance of these various sciatic, crural, or obturator pains, it cannot, in our experience, be held that any one nerve track more than another is pathognomonic of villous arthritis of the hip.

But while no diagnostic significance attaches to either pain along the front or the back of the thigh, we would emphasize the fact that, in our experience, *simultaneous pain along the anterior crural or obturator, as well as along the sciatic nerve*, is very distinctive of this disorder.

Associated Lumbar Pain.—Almost invariably these subjects suffer at the same time with pain in the loins, which of course enhances the liability to confusion with sciatica—a condition so commonly associated with lumbago. But the lumbar pains met with in this hip disorder are easily differentiated from those accompanying ordinary sciatica. Those of the former are insidious and gradual in onset, subacute in degree, and moreover, the lumbar pains arise *secondarily* to the hip mischief. In other words, they are purely *static* in origin—a consequence of the erroneous deflection of body-weight; for, as we shall shortly see, there is commonly present a state of lordosis with transverse rotation forwards of the pelvis, and so in this way additional strain is thrown upon the sacro-iliac ligaments. In the latter the lumbar pain or lumbago is abrupt in onset, very acute in degree, precedes or is *primary* to the sciatica, and is due to an inflammatory process in the fibrous tissues of the lumbar muscles, which eventually extends to the sheath of the sciatic trunk.

Alterations in Gait and Attitude.—In the initial stages no change can be detected, if we except the temporary limping that follows the occasional *incarceration of the enlarged synovial fringes.* But with their growth and progressive involvement of the membrane the intra-articular irritation produced gives rise to spasm of the related muscles, and this to malposition through slight flexion of the hip-joint.

On inspection, therefore, it will be noted that the patient stands on the sound foot; the other is usually a little advanced, and he tends to rest upon the ball rather than upon the heel. At the same time, in order to save the affected joint, the knee on the same side is slightly bent, while the foot, and even the whole limb, are held in a position of external rotation.

Limitation of Mobility.—Relative fixity of the joint is, of course, the sign which for diagnostic purposes is superior to all others, and in these cases there is constantly present some limitation in the proper arc of motion in the hip.

To elicit its presence the patient should be undressed, and lie, not on a soft bed, but on a table or a hard couch. It must then be noted whether he can recline flat on his back, with the ham of the affected limb closely applied to the underlying surface, and this without any arching of the lumbar spine.

Far more often than is generally realized will these cases—so often mistaken for sciatica or rheumatism—be found presenting a well-marked *lordotic* curve, while the knee of the affected limb is at the same time more or less raised from the table.

If now an attempt be made to press the knee down into full extension, the existing lordosis will be still further accentuated. (The extent of hip flexion can be ascertained by flexion of the *sound* thigh until the lumbar column is straight.)

Again, if the patient be asked to stand with legs parallel and knees fully extended, the same arching due to hip flexion will be observed, though it can be avoided if the knee be slightly bent.

The detection of this *flexion contracture* is of prime value as an indication of the articular nature of the affection, but at the same time there are always present further restrictions in mobility.

To ascertain their presence, the affected limb should be grasped with one hand below the knee, while the other lays hold of the iliac crest so as to detect whether during passive movement the pelvis remains still or moves with the thigh. If then the respective movements of flexion, extension, abduction, and rotation with the thigh flexed be executed, it will be noted that even in the very early stages there is definite limitation, and movement beyond a certain arc is painful. The restriction of mobility is presumably due to reflex irritation of the muscles controlling the joint, which are maintained in a state of spasm, proportional to the activity of the intra-articular disease.

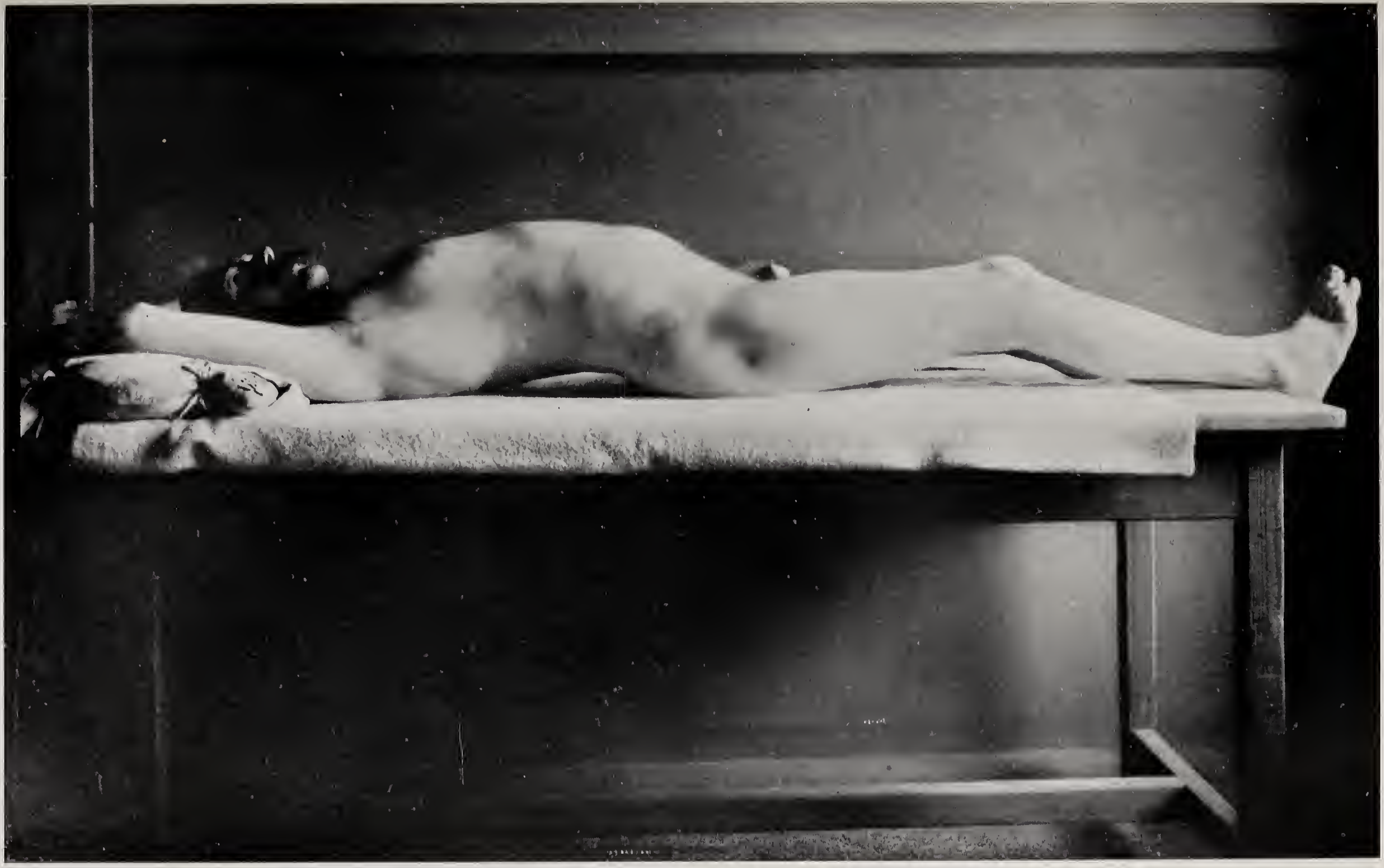


FIG. 125.—Early osteo-arthritis of right hip, showing flexion contracture of hip-joint and lordosis.

To face page 642.

Maximal extension and flexion, especially the former, are usually difficult or impossible of accomplishment, while the range of inward rotation and abduction is appreciably restricted.

Sometimes also the hip, in addition to being slightly flexed and externally rotated, is a little abducted. In this event, to allow of his moving about, the flexion and abduction must be compensated for. This is attained by drawing up the sound side of the pelvis and depressing the opposite, and through this tilting the femur is brought inwards to the middle line. Simultaneously the lumbar column is curved, with its convexity facing towards the diseased side.

Owing to the flexion contracture of the limb, the patient feels his activity becoming curtailed in various ways. Thus, he finds, on attempting to sit down, that he cannot, as formerly, sink with ease into the depths of a chair, but is compelled to lower himself gently on to the extreme edge of the seat, keeping the affected thigh as far as possible in a direct line with the axis of the trunk, with the leg either remaining fully extended or flexed at the knee.

As might be expected with such limitation, crossing the affected leg over its fellow may be absolutely negatived, or, if possible, can only be achieved with great pain and difficulty, the aid of the hands often having to be enlisted to raise the crippled limb into the required position. Hence, too, arises the increasing trouble these patients find in putting on their shoes and stockings.

So much for our clinical account, and it will be convenient here to summarize the features which in our experience are suggestive of villous hypertrophy in the hip-joint.

1. *Deep-seated articular pain*, at first of abrupt incidence and disappearance, and later more constant and accompanied by capsular tenderness.
2. *Referred pains*, which likewise are subject to remissions and exacerbations, and which more commonly are felt, not only along the sciatic, but *simultaneously along the obturator or crural nerve-trunks*.
3. *Fixity of the joint*, as shown by slight *hip flexion* with lordosis.
4. *Limitation* of extension, flexion, inward rotation, and abduction.
5. *Eversion of foot and leg.*

Our presumption as to the villous nature of the disorder is arrived at partly from consideration of the clinical symptomatology, and partly from the results of skiagraphy.

On the clinical side we have the occurrence of attacks of *pain* with *pseudo-locking* sensations, which come and go in the same erratic fashion that we are familiar with in the case of the knee.

In addition, too, we have in some instances accessory evidence in the shape of villous change in the *knees*, which, of course, is at this site more easy of recognition.

Moreover, we have, as in the latter variety, similar indications of static disturbance, either *flat-foot*, genu valgum or varum.

Lastly we have the striking fact that, despite the presence of such unequivocal symptoms and signs of articular hip disorder, yet skiagraphy often reveals *no structural alterations in bone or cartilage.*

The disorder, in default of static correction, tends to progress, though as a rule with infinite slowness.

Eventually, after years, or even decades, the case gradually assumes the features of an *osteo-arthritis* of the hip; but we would here, as in the knee, emphasize the extreme length of time which may elapse before *bony outgrowths* can be detected, and this despite the presence of hip flexion and other symptoms pathognomonic of the articular site of the disease.

Relationship of Villous Synovitis to Osteo-Arthritis.

In reflecting on the life-history of villous synovitis of the knee and hip, and the manner in which it slowly and imperceptibly approximates to osteo-arthritis, the question naturally arises as to the nature of the relationship that obtains between the two conditions.

Is the villous change primary and the osteo-arthritis secondary to it, or *has the former merely masked a more insidious bony and cartilaginous change ?*

Personally we incline to the latter view—*i.e.*, that these cases of so-called "villous synovitis" are *ab initio* examples of *osteo-arthritis ;* but if so, there is little doubt that our textbook descriptions of osteo-arthritis, especially of the hip, will have to be considerably modified.

For if this hypothesis, as is probable, be the correct one, we shall have to postulate two stages in the life-history of osteo-arthritis:

1. A *primary or pre-osteophytic* phase, often of prolonged duration, whose clinical characteristics are those of villous hypertrophy.
2. A *secondary or terminal* stage, in which bony and cartilaginous outgrowths make their appearance.

But a mere glance at the clinical descriptions of osteo-arthritis, as drawn by older, and for that matter even current, writers, reveals a striking disregard on their part of the primary or early symptoms of this grave disorder.

For, saving a brief allusion to initial pain and stiffness, they pass without further ado to a delineation of its terminal features, as if, forsooth, the morbid process, like Jonah's gourd, had sprung to maturity in a night.

So abrupt a transition has doubtless proved most misleading, obscuring as it does the salient features of the life-history of osteo-arthritis — viz., its extraordinary slowness of evolution, one measured often not so much by years as by decades.

Our own clinical observation, indeed, makes it abundantly clear to us that the profound articular disorganization that eventually ensues in osteo-arthritis is only very slowly arrived at, and that it is invariably preceded by a prolonged period during which the only symptoms clinically appreciable are those of *villous hypertrophy.*

In the case of the knee, of course, such villous changes are easily recognized, but we would lay stress on the fact that also in the hip their presence may be determined by a discriminating analysis of the subjective symptoms, supplemented by a careful examination of the hip in regard to restricted mobility, especially *flexion contracture.*

The formidable character of the changes that ultimately develop in osteo-arthritis assuredly indicates the desirability of arriving at a true diagnosis at the earliest period possible.

To this end we believe that the recognition of this villous change as a precursor of osteo-arthritis, coupled with a due appreciation of the important rôle played by *static* factors in its production, would open up a new and more hopeful area in our treatment of the latter condition.

This much we can affirm after prolonged experience: that, given correction of any static faults, flat feet, etc., the symptoms, whether in the hip or knee, tend to disappear, and, moreover, in cases of longer standing, where osteophytes have developed, pain is relieved and the morbid process apparently arrested.

Diagnosis.

A careful study of the previous history and thorough physical examination are necessary to achieve an *etiological* diagnosis in any given case.

The disorder being generally monarticular, an account of injury, direct or indirect, is frequently forthcoming, but often of so remote a date that it is difficult to assure oneself of its causal connection. Apart from trauma, search should be made at the same time for any possible source of *unilateral strain*—viz., a weak or pronated foot, or, as we have sometimes seen, a pes excavatus valgus. Other points to be borne in mind are congenital inequality in the length of the legs, or acquired asymmetry through malunited fracture, or, failing this, knock-knee or some faulty postural attitude.

Local Symptoms and Signs.

Pain—Local.—This is deep-seated in the groin or behind in the region of the great trochanter, with tenderness to pressure at these sites.

At first it is intermittent and periodic, and due to pseudo-locking, but in later stages it is more constant.

Pain—Referred.—Coincident sciatic and anterior crural or obturator neuralgias are very distinctive of this disorder.

Meralgia paræsthetica is sometimes a feature, while paræsthesiæ are often present over the area of distribution of the crural and sciatic nerve-trunks.

Alterations in Gait and Attitude.—In early stages there is no change except a temporary limp after pseudo-locking.

Later, through slight flexion of the hip, the patient stands on the sound foot, with the other leg usually advanced and the knee flexed, while the foot and leg are *everted*.

Disorders of Mobility.—Slight hip flexion, with compensatory lordosis is present. Maximal extension and flexion are difficult, inward rotation and abduction are appreciably restricted. Abduction, and rotation with the thigh flexed are also limited.

Differential Diagnosis.

Tuberculous Coxitis.

The subjects of this affection are usually children or adolescents, those of villous arthritis are middle-aged.

Pain though markedly local, may be referred to the knee; while tenderness on percussion of the trochanter is to be evoked.

Marked rigidity of the joint from spasm, with general and local muscular wasting, is present.

There is a positive reaction to tuberculin.

Skiagraphy reveals thinning of the bone, with ill-defined margins.

Late complications are abscess formation and hectic fever.

Osteo-Arthritis of Hip.

As previously stated, villous arthritis may be a forerunner of this condition, but the presence of the following phenomena would be suggestive of definite osteo-arthritis:

The existence of real shortening.
Wasting of gluteal and thigh muscles.
Limb abducted, everted, and flexed.
Coarse grating on movement.
Trochanter prominent and enlarged, with exostoses on skiagraphy.

Primary Sciatica.

The chief difficulty arises when, in addition to local pain and tenderness of the hip-joint in villous arthritis, there are present pains referred particularly to the sciatic nerve.

The differentiation here depends on the points of distinction between primary and secondary sciatica.

Pain in *primary* sciatica is limited to the nerve trunk, but, when *secondary* to villous arthritis of the hip, it is referred to the area of distribution of the sciatic nerve, and is almost always associated with *coincident* pain along the anterior crural or obturator nerve.

In primary sciatica tenderness of the nerve trunk is persistent, but, when secondary to villous arthritis, it is either absent or slight compared with the subjective pain.

Primary sciatica is often *preceded* by lumbar or gluteal pains of abrupt onset and acute character, but the lumbar pains that occasionally complicate villous arthritis ensue *secondarily* to the joint trouble, and are gradual in onset and subacute.

In sciatica, passive flexion of thigh with the knee extended is painful and restricted; all other movements are usually painless.

In villous arthritis there is limitation of flexion, extension, inward rotation, and abduction.

Local pain and tenderness in groin and trochanteric region are absent in sciatica, but present in villous arthritis.

Prognosis of Chronic Villous Synovitis.

This will depend on, firstly, how far any existing *static deformities* in the lower limbs can be satisfactorily corrected, as if this be attainable, the outlook is distinctly good.

If that unfavourable complication, *obesity*, be a feature, the prognosis will hinge on the amenability of the subject to a reduction cure. When corpulent, these persons are frequently and erroneously regarded as being of *gouty* habit, and without further ado are counselled to eschew meat.

Placed under this embargo, they are but too apt to eat to excess of carbohydrate and saccharine foodstuffs, and in this way a vicious circle is established. For on such a diet their body-weight increases, and *pari passu* more and more strain is thrown upon their flattened feet, and so the secondary villous change in their knees proceeds apace.

Persons thus afflicted are amongst the most frequent habitués of spas. But, as far as our experience goes, no waters, radio-active or otherwise, produce the slightest lasting effect, unless their course of treatment includes a substantial reduction of body-weight by appropriate modification and restriction of the food intake. If, however, such be undertaken, and at the same time well-adjusted footplates be resorted to, the results are most gratifying, as *pari passu* with the decreasing weight the knees progressively improve, and the disability quickly disappears.

When *varicose veins* are present the outlook is less hopeful, as in addition this complication may have to be especially treated, and obviously the prognosis will be dominated by their response to elastic supports, or, failing this, ablation.

Lastly, if a case only come under notice after many years have elapsed, then almost certainly new bony formations will be detectable by skiagraphy. Their presence does not necessarily darken the prognosis, for, if slight in degree, they may only interfere mechanically with extreme flexion or extension. Accordingly, if the feet be adjusted, and in addition the knees be fitted with an appropriate cage to limit movement to a point short of producing pain, the prognosis, *ceteris paribus*, is good, as far as relief of pain and usefulness of the joint are concerned.

CHAPTER XLIV

VILLOUS SYNOVITIS

General Treatment.

THE general indications for treatment in villous synovitis, whether situate in the knee or hip joint, are substantially identical, inasmuch as in our conception of their etiology the causal factor in their development is one of disordered equilibrium. Such, as before pointed out, is more commonly referable to static deformities in the lower extremities—*i.e.*, flat feet, or in rarer instances knock-knees or asymmetry in length of the limbs, whether congenital or acquired.

A frequently associated condition is obesity, which may either predispose to flat-foot or aggravate this condition when existing. In some instances no more definite cause can be assigned than a general lack of muscular and ligamentary tone, which may be the outcome of an innate delicacy of constitution or the legacy of some debilitating illness—for example, influenza.

We shall, therefore, consider those factors which are, so to speak, causal or germane to the disorder as it appears both in the knee and hip, and subsequently shall deal with the local treatment suitable for each.

Correction of Static Deformities.

In view of the direct causal relationship of flat-foot to these disorders, it seems incumbent upon us to call attention to the desirability of recognizing this static deformity during its early stages, as doubtless the best treatment in villous synovitis, as in other disorders, is prevention.

The signs and symptoms present will vary according to the nature, duration, and severity of the static foot error. Thus, much will depend on whether the flat-foot is flexible or rigid.

In these *flexible* as opposed to rigid types of flat-foot there is an absence of structural change, and the arch only sinks when the body-weight is thrown upon it. Consequently these subjects should always be examined in the erect position, as on standing for a moment the foot rolls down on its inner side.

In these cases, even before palpable changes in shape have ensued, *pain on passive inversion or abduction of the foot, with tenderness under the heel or scaphoid,* usually indicate ligamentary strain.

It is important, too, to note that even in the early stages *eversion* of the foot is present, and this may exist before the arch is sunk—*i.e., pes valgus.* It is most easily detected when the patient standing with bare feet is looked at from *behind.*

In the normal person the axis of the heel or os calcis is in a line with the vertical axis of the leg, but in pes valgus the heel deviates laterally outwards, and the Achilles tendon, instead of passing straight down into the heel, presents a curve whose concavity faces outwards.

Subsequently the arch sinks, and the condition of *pes plano valgus* is produced, and here the protrusion of the internal malleolus, as well as the sagging of the inner border of the foot, will scarcely escape recognition if the bare foot be inspected.

The frequency with which one sees patients with nothing more than a flat foot classed as *gouty,* and condemned to purin-free foods and other dietetic penances, seems to us to fully justify this brief digression on the early symptoms and signs of flat-foot.

In *rigid* as opposed to flexible flat-foot the deformity is permanent, and adaptive changes have taken place in the bones or ligaments, and it is well to remember that, despite the severity of the deformity, such subjects may complain of no pain in the feet.

Early or Slight Cases.

In those examples in which the power of *adduction and inversion,* though still retained, is deficient, the wearing of proper foot-gear in conjunction with exercises will suffice.

Proper Foot-Gear.—In all cases ill-fitting boots should be abandoned. Wearing of elastic-side boots, sandals, or shoes should be absolutely forbidden. A laced boot only, and this not of the Derby pattern, fulfils the necessary requirements.

The boots worn should have a straight inner line, and the forward part of the boot should be as wide as the spread of the toes when *bearing the body-weight,* as it is important that the individual toes should each touch the sole.

The forward part of the sole should be flat, and its lower surface should touch the ground at all points, and not be convex from side to side. Lastly, the heels should be low.

Exercises.—Inasmuch as these patients have a tendency to walk with divergent feet—the very position which favours the

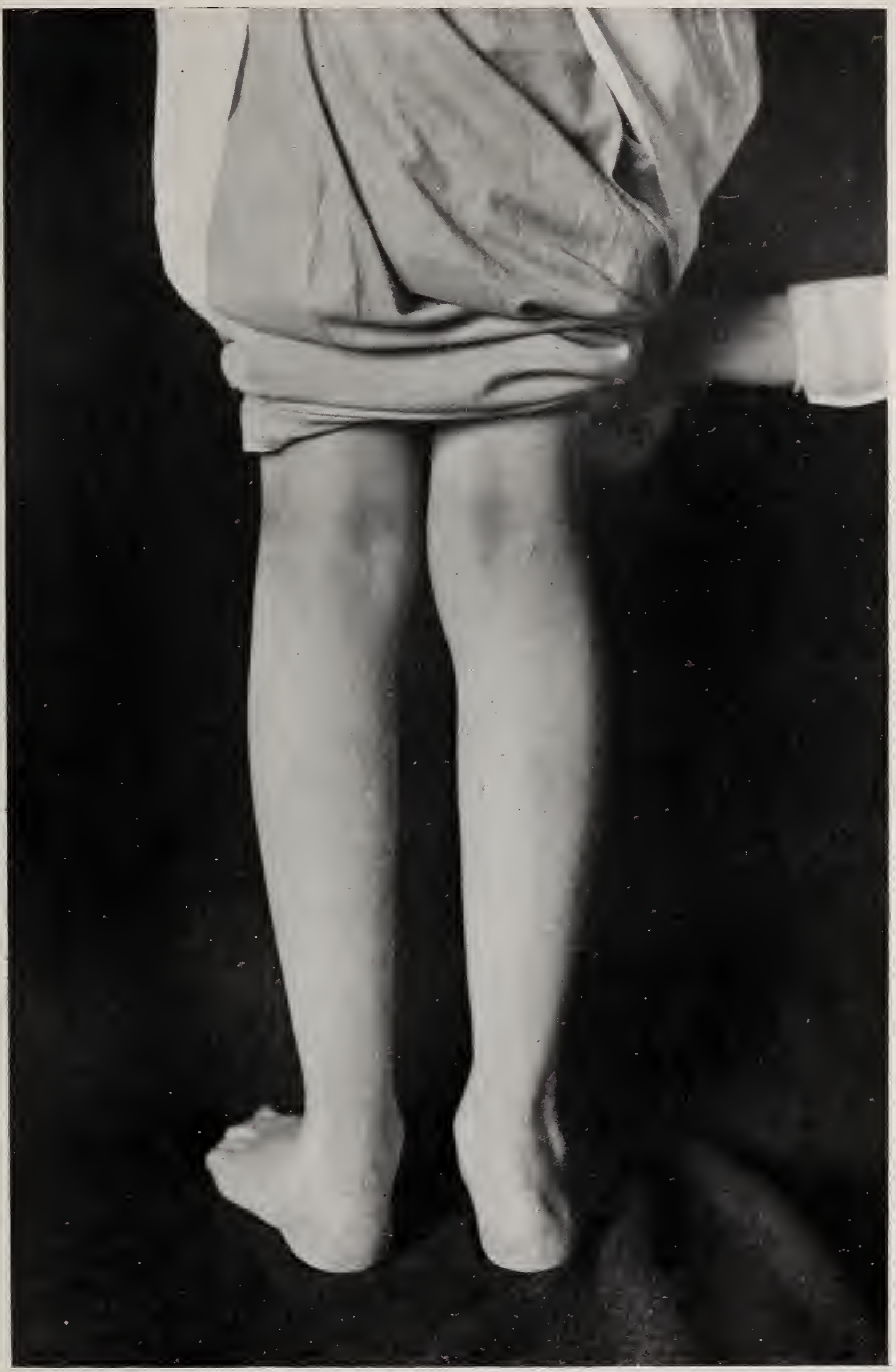


FIG. 126.—Flat-feet, pronated and abducted. Note outward rotation of os calcis and concavity of tendo-Achillis turned towards outer side.

To face page 650.

development of flat-foot, with erroneous deflection of body-weight to the inner side—they should be enjoined to practise the following exercises daily:

1. The patient should walk as far as possible on the outer border of the foot, with the inner edge raised. Also he should keep his feet parallel, with the fore part adducted or directed slightly inward. He should stand fair and square on both feet, not favouring one more than the other, nor at any time standing on one foot alone. He should cultivate the habit of walking on tip-toe. When sitting, he should separate his knees and cross his legs, with his feet resting on their *outer* borders.

2. The patient, standing erect, with hands on hips and toes turned in, rises to tip-toe, during which he brings his heels, but not his internal malleoli, together, and then sinks down on his heels. This is to be repeated as often as his strength permits, and in so doing he strengthens the flexors of the toes and extensors of the feet.

3. To strengthen his peronei and raise the plantar arch he should stand in the same position as in the last exercise. The inner borders of his feet are then turned upwards until the body-weight falls on the outer margins of his feet. After standing in this position for a few seconds he sinks back on to the full sole, repeating this movement several times.

4. To strengthen the anterior and posterior tibial muscles, the patient should stand on his heels and toes alternately.

These exercises should be carried out twice daily, and dancing, skipping, etc., should be encouraged.

A combination of *resistance movements* with the foregoing is desirable, and, the position of the weakened foot being one of *abduction*, they should be practised in *adduction* against resistance applied to the ball of the great toe.

Severe Cases.

In those instances in which the arch, though sunken, admits of correction by voluntary muscular effort, a boot with an oblique sole or an efficient foot-plate should be prescribed in addition to the exercises above enjoined. Such artificial aids as foot-plates must, of course, be accurately fitted, and if necessary plaster casts prepared.

Simultaneously every effort should be made to restore the natural powers of the arch, when of course these should be dispensed with. Their discontinuance is indicated when the irritability of the foot has subsided; but such should take place gradually, and at first only for short periods, pending the recovery of efficient muscular support.

In addition to the foregoing measures, *massage*, an indispensable adjunct to the treatment of all forms of flat-foot, should be performed daily.

Alternate hot and cold douches, too, to the feet, or local hot-air baths followed by cold douching, will, with electricity, aid in restoring the tone of the inefficient muscles.

We have entered at this length into the treatment of flat-foot, inasmuch as the local therapy of the knees or hips by massage, hyperæmia, ionization, etc., must be considered as entirely subsidiary to the correction of the static fault when present.

Rigid Flat-Foot.—In these instances, in which all flexibility is lost, and manipulation fails to correct the sunken arch, resort must be had to more radical measures, for which surgical textbooks must be consulted.

Obesity.

When complicated by obesity, we have for many years subjected these patients to the following restricted diet with the object of reducing their body-weight, and thus lessening the strain on the diseased articulations—a condition we consider of imperative importance.

Carbohydrate and fatty foods must be limited or temporarily withdrawn. Bread should be torrefied, milk, cream, and butter abstained from, and sugar replaced by saccharin.

Meat, game, poultry, fish, also vegetables, save the roots and tubers, are permissible. Clear soups are allowable, and salads devoid of beetroot or oil.

Alcohol is undesirable, but if taken a little whisky or light, dry wine is most suitable.

The intake of fluids during meals should be abstained from, or be strictly limited and reserved to the end of the repast.

For flushing effects, hot water should be freely taken either one hour before or two hours after a meal.

To hasten reduction, hydrotherapeutic measures and electric-light baths are useful, and they should be given in accordance with the principles laid down in a previous section. Arising as these cases often do in middle age—a period of life during which *gouty* manifestations are common—a correction of such constitutional tendencies by a course of spa treatment is highly desirable.

For loss of muscular and ligamentary tone the general habits of life should be revised, and, in the absence of contra-indications, a regular course of graduated hydrotherapy, massage, and suitable exercises must be embarked upon and persisted in, until this or any other departure from normal health is as far as possible corrected.

Villous Synovitis of Knee.

Local Treatment.

The measures undertaken for the correction of the varied degrees of flat-foot that may be present must be persisted with until not only the static foot error be corrected, but also for some time after all signs of irritability in the knees have subsided.

Mechanical Supports.—Firm bandaging, strapping, or a snugly-fitting knee-cap should, according to the degree and severity of the case, be employed. The strapping should be so applied as to exert considerable compression over the front and sides of the knee, as we have found this very effectual in relieving the pain and controlling the tendency to recurring effusions from internal traumatisms.

Relative fixation of the joint, when painful or irritable, is often very useful, especially when there is a tendency to pseudo-locking and recurring effusions.

Very commonly movement of the joint is only painful during extension, and we have found the wearing of a light knee-cage very serviceable. This, while it does not interfere with flexion, must be so arranged as to limit extension to a point short of producing pain. It should be removed at night, and passive movements carried out. When the range of painless extension is enlarged, the cage may be dispensed with.

Massage.—If this be invoked, it should be entirely *derivative* in character—*i.e.*, confined to the muscles—and in this way it may prove of great value in reducing the passive hyperæmia of the synovial membrane, which is so conspicuous a feature in these cases.

When, as is very common, the condition is associated with *varices* of the lower limb, it is hardly necessary to state that gentle *effleurage* alone over the vessels is permissible, though all other manipulations may be practised over other parts of the limb. Inasmuch as this condition naturally aggravates the tendency to hyperæmia of the knees, it is highly necessary that it should receive special attention.

Massage will only do good in those cases in which the veins empty themselves thoroughly when the patient lies down. Otherwise it will be necessary to have recourse to mechanical supports, such as bandages or elastic stockings. We have found it a good plan to to impress upon patients suffering from varicose veins the advisability of lying at night with the foot of the bed slightly raised.

Hyperæmia and Hydrotherapy.—Hot-air baths frequently prove useful, and where the condition is associated with varicose veins we have been impressed by the improvement that ensues, not only in the joint, but in the accompanying œdema of the limb. Passive hyperæmia by Bier's method is also suitable for these cases, and some speak highly of it. When such are not available, we should like to emphasize the value of *local stimulating or heating* compresses, which need not be changed more than once in every twelve or twenty-four hours. Their effect is most marked when the villous formations and capsular thickenings are moderate in degree. They relieve in a striking manner the pain and stiffness, inasmuch as they stimulate the circulation and promote the absorption of exudate. When possible, too, resort should be had to hydrotherapeutic measures, such as alternate or Scotch douches, as these also are very helpful in dissipating infiltration or thickening.

Surgical Measures.—If, notwithstanding the employment of all the foregoing methods of treatment, the condition shows no amelioration, then an arthrotomy may have to be undertaken.

Prior to its performance a skiagraph is necessary to ascertain the presence or absence of marginal bony growths. A previous insufflation of the joint with oxygen will afford a clearer view, and even in cases where osseous formations are absent the shadow of an infrapatellar fibrous pad may be revealed.

Arthrotomy is, of course, chiefly indicated in those examples of the disorder which are marked by well-defined symptoms of locking and recurring effusion that refuse to relent to more conservative treatment.

The removal of the enlarged fringes offers the best and speediest method of obtaining a lasting cure. For Locke and Osgood, who have operated extensively in this condition, state that there is no tendency to recurrence after excision of villi, as the cicatricial tissues left at the site do not readily become a starting-point for fresh papillary overgrowth.

Villous Arthritis of Hip.

Local Treatment.

The primary indication in this, as in the knee, is the correction of static foot errors—viz., flat-foot, knock-knee, or unequal length of legs, either congenital or acquired.

Because of the pronounced tendency to *eversion* in these cases, one of the most important injunctions to the patient is the necessity on his part of walking with his feet in a position of *inward rotation.* Often, indeed, the habitual adoption of this position during exercise will dissipate much of the pain experienced during walking and standing.

Mechanical Supports.—Here, as in the knee, relative fixation may be necessary when the joint is very irritable and painful; also in the case of recurring sensations of "catching" due to intrusion of the villous growths between the joint surfaces.

For this purpose firm bandaging in a spica fashion may suffice, and if this prove insufficient, a leather ensheathing apparatus should be worn until some time after the acute symptoms have subsided. It should, of course, be removed at night and reapplied in the morning.

Massage, Active Hyperæmia, and Exercises.—In all cases massage should be practised, the manipulations to include the whole limb, while special attention must be paid to the buttock and loins.

When a retentive apparatus is worn, the massage should be administered every morning before its readjustment. The rubbing, as in all joint affections, may be profitably preceded by a hot-air or electric-light bath, with, if possible, the use of a local projector, so that the radiant heat may impinge more particularly on the gluteal region.

Should these not be at command, a hot sitz bath of half an hour's duration may be employed instead, and these as well as hot stimulating compresses, if taken at night, tend to lessen the muscular spasm and relieve the sciatic and crural neuralgias so frequently present.

After exposure to hot air with subsequent massage, passive exercises should be assiduously practised. This triad of *hot air*, *massage*, and *exercises* is the most valuable means we possess of controlling the joint mischief. It should always be followed by rest in the recumbent posture for half to one hour, and is not contra-indicated even in cases requiring a retentive apparatus.

The tendency to restriction of movement is very marked, and the exercises should include knee flexion, with abduction and rotation exercises of the hip.

In this condition, villous arthritis of the hip, so far as we know, no operative measures have been undertaken. But having regard to the fact that in these cases, if neglected, osteophytic formations sometimes ensue, it is at least questionable whether it would not be more rational to resort to such before bony outgrowths become established.

The good results, too, that have followed the removal of bony growths in definite osteo-arthritis of this joint would seem to justify such interference during this villous and, as we believe, *pre-osteophytic* stage of the latter affection.

CHAPTER XLV

SACRO-ILIAC RELAXATION

Synonym : Static lumbago.

In the preceding sections we dealt with the consequences of static disturbance as exemplified in the knee and hip joints, and now we pass on to consider this same factor in its relation to the sacro-iliac synchondroses.

Before doing so, it seems advisable to refer briefly to the anatomical relationships of these articulations, which play so important a rôle in the mechanism of the pelvis.

Anatomical and Mechanical Considerations.

The sacro-iliac synchondroses are formed by the articulation of the auricular surfaces of the ilium and sacrum, and for their stability they depend mainly on muscular and ligamentary support.

This being so, it is clear that—despite the density of the supporting ligaments, especially the posterior group—the sacro-iliac synchondroses, like the symphysis pubis, constitute one of the weakest parts of the pelvic girdle. Their extreme liability to overstrain is easily accounted for, when we bear in mind the large part they play in the transmission of body-weight. For one of the component bones—the sacrum—which supports the spinal column, is also the keystone of the femoro-sacral and ischio-sacral arches of the pelvis, which respectively transmit the body-weight in the erect and sitting posture. It follows, therefore, that these articulations are very sensitive to any alteration from the normal in pelvic or sacral inclination, which of course throws increased strain upon the supporting ligaments.

Now, by the older physicians it was believed that, normally speaking, no movement existed at the level of the sacro-iliac junction.

Naturally, therefore, they were regarded as being practically immune from the effects of strain, and so the local and referred pains experienced were attributed to *lumbago*, *sciatica*, and so forth.

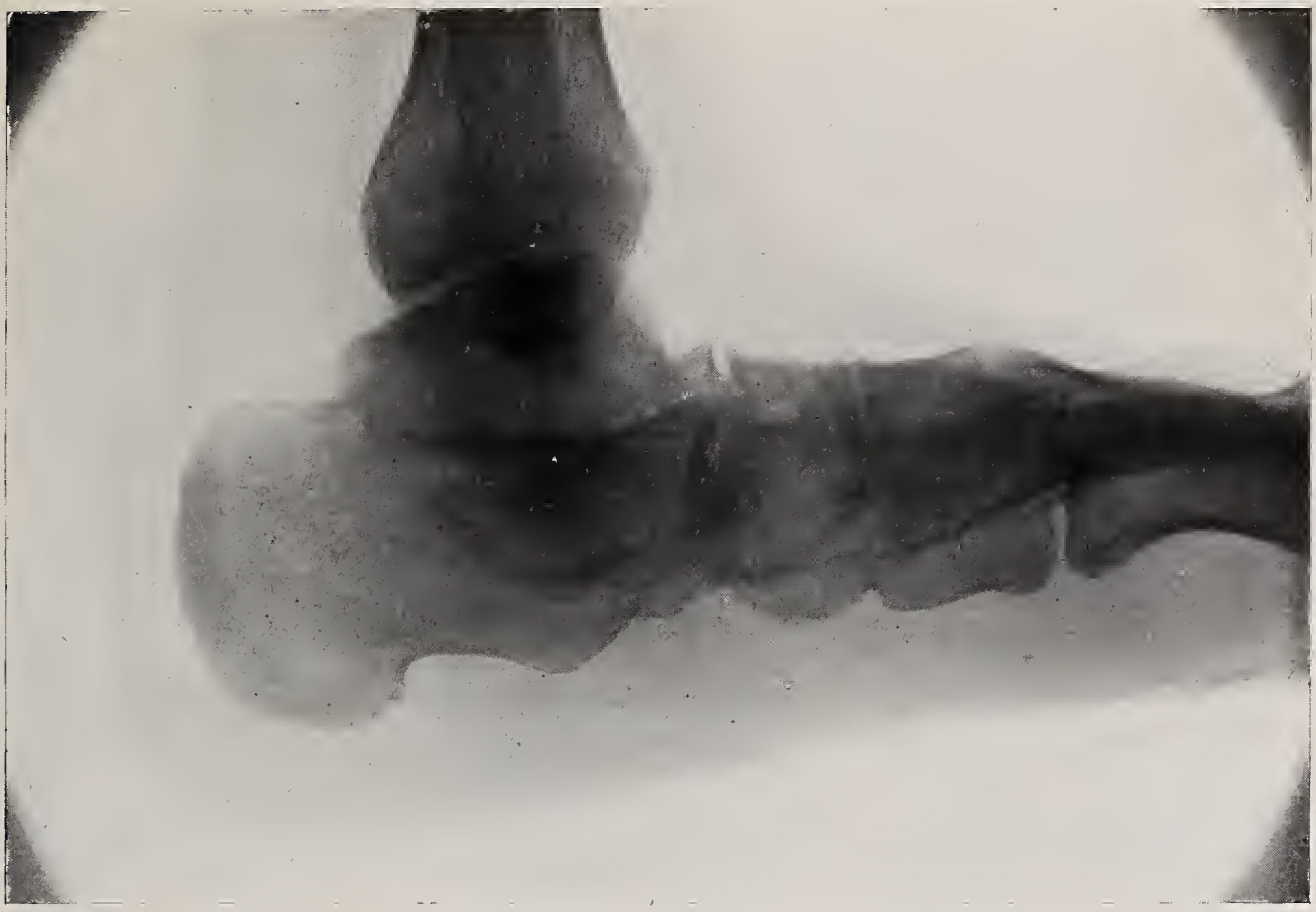


FIG. 127.—Skiagram of marked flat-foot with small osteophytes at superior articulations of tarsal bones.

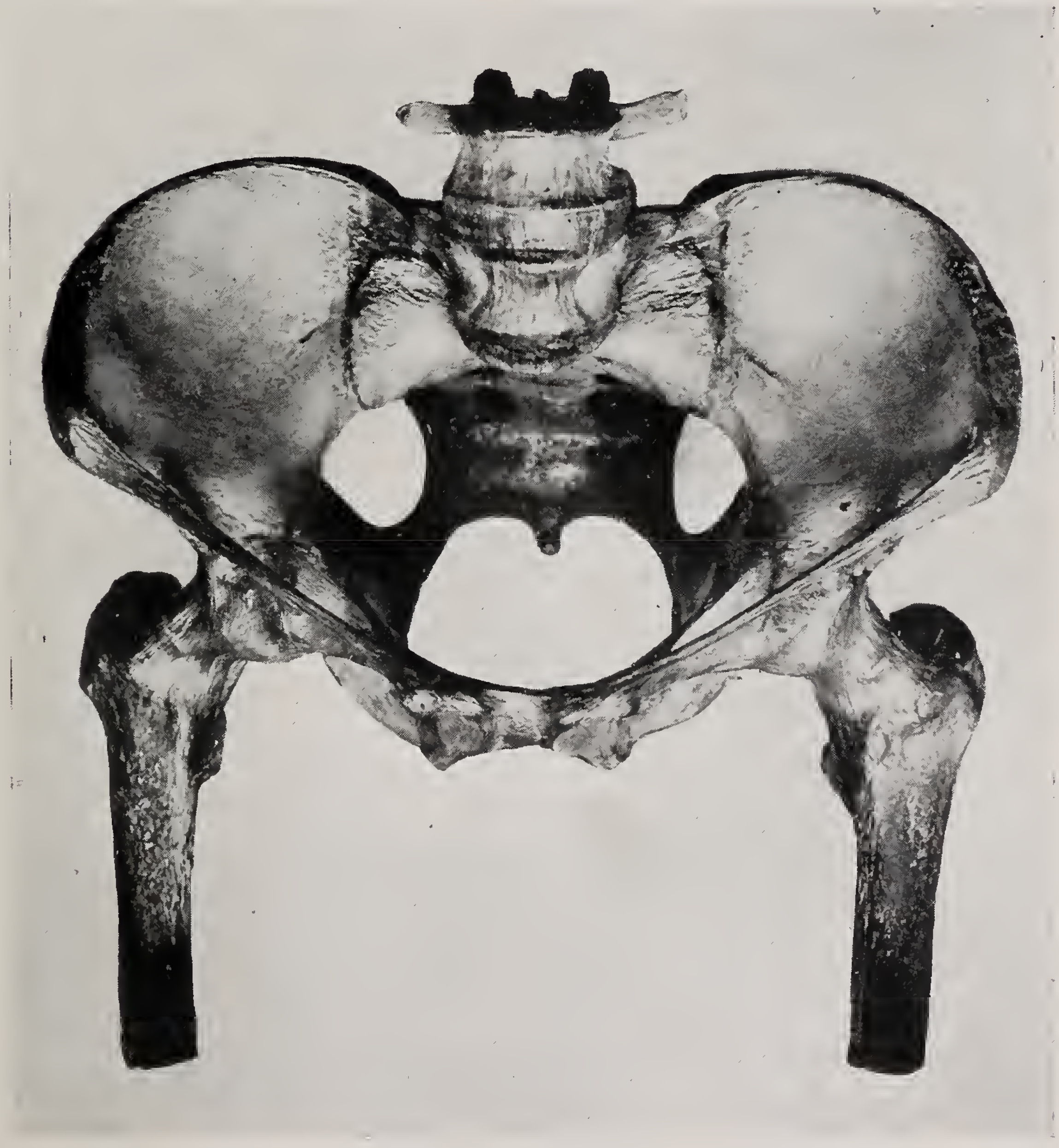


FIG. 128.—Normal pelvis. (U. C. H. Anat. Museum.)

To face page 656.

But recent researches by Goldthwait, Osgood, and others have shown this to be erroneous, and that, far from being abnormal, a certain limited measure of mobility is probably present in all individuals.

From their studies it is clear that the auricular surfaces of the sacrum and ilium are capable of slight movement upwards and downwards each upon the other. In addition, moreover, the sacrum rotates round a transverse axis passing through the second sacral vertebra, and in this way an increase or decrease of the pelvic diameters at the brim and outlet is secured.

It has, of course, long been recognized that the sacro-iliac joints during pregnancy admitted of a limited degree of displacement, but this was held to be peculiar to the gravid state, whereas from Goldthwait's researches it would appear to be simply an exaggeration of the normal degree of displacement permissible in these joints.

The fact that, physiologically speaking, movement is possible in these articulations is of great clinical importance, for owing to their rich endowment with nerves they are capable of simulating most closely the symptoms of lumbago, sciatica, and other affections.

Etiology.

The disorder was for long reputed to be restricted to women, and, moreover, to be met with in their sex only as an epiphenomenon of the gravid state.

As the result, however, of more extended observations, it appears that it can occur in women apart from pregnancy, and, moreover, also in men. Indeed, Dunlop, a recent writer, states that more than 50 per cent. of his series were males or unmarried women.

From our own experience, we can confirm him as to its incidence in males as well as females, but in the former it is generally attributable to a definite *trauma or strain*, while in the weaker sex it is more often the outcome of *static disorders*, among which pregnancy may be reckoned.

Now, it is quite clear that the more arduous occupations followed by men would sufficiently account for its being more commonly of definite traumatic origin in their case, and in our opinion the majority of the cases of traumatic lumbago arising in miners, labourers, and so forth are really attributable to sacro-iliac strain. Some writers, like Buchholz, for example, have noted that the condition is actually more common in men than in women.

The discrepancies to be observed in the sex incidence of the affection as recorded by various observers are probably, we think, explicable on the following grounds: Thus, if we except the severe types met with occasionally in pregnancy, the examples arising in women are more insidious in development and of less severity, and therefore very likely to be overlooked or attributed to other causes, and in this way their frequency under-estimated.

For if, on the one hand, men are more liable to *trauma* in this region, women are more open to *insidious strain*, not only through pregnancy, but through other conditions leading to disturbance of the weight-bearing mechanism.

Again, from an anatomical point of view, the fact that in men definite trauma is more often necessary to evoke the phenomena of sacro-iliac strain is precisely what one would expect, having regard to the fact that the pelvic synchondroses in their case are more stable by reason of their greater size, the more pronounced obliquity of the auricular surfaces, and the innately stronger muscular and ligamentary support they enjoy.

In women, again, apart from the anatomical differences presented by their pelvis, we have the fact that their ligaments from physiological causes, pregnancy and menstruation, are liable to periodic relaxation, and they are certainly also more open to derangement of the weight-bearing mechanism by the wearing of improper foot-gear, badly-fitting corsets, etc.

Relaxation of the sacro-iliac synchondroses may be produced by a variety of causes, some of which are physiological, and others pathological, in nature.

Physiological.

Of this type *pregnancy* furnishes the best example, for, as we know, from the time of Hippocrates it has been recognized that a lax condition of the pelvic articulations is present in a greater or less degree in the gravid state.

Formerly it was thought that the displacement occurred only at the pubic symphysis, but recent researches show that such separation of the pubic bones is impossible, save in the presence of a relaxed state of the sacro-iliac joints.

This laxity is favoured by the serous imbibition of the pelvic articulations which develops during pregnancy, and, while physiological in nature, the mobility at times transcends the normal, leading to pain referred to the symphysis or sacrum, with unsteadiness of gait or even complete disability.

The mode of production appears to be that the uterus, through its weight, draws the lumbar spine forward, and so pelvic inclination is increased and the sacro-iliac ligaments become overstretched.

The symptoms usually develop during the latter part of pregnancy or after parturition, and are more common in multiparæ who have been subjected to undue strain through walking or carrying heavy burdens, or who are the subjects of some constitutional weakness. Usually after delivery the parts recover their tone within a few weeks, but occasionally the abnormal mobility persists indefinitely, and in such cases furnishes some of the most distressing types of sacro-iliac relaxation.

From Goldthwait's researches, too, it would appear that a similar laxity of the pelvic ligaments develops during *menstruation,* and in rare instances to an extent so marked as to cause appreciable increase of mobility, with difficulty in locomotion.

Pathological.

Broadly speaking, the causal factors in this group fall into two classes: (1) traumatic; (2) mechanical or static.

Obviously, from an etiological point of view, the difference between them is *quantitative* rather than qualitative, the lesion in the former being attributable to *sudden* and *violent* injury, and in the latter to *persistent*, though *slight*, strain.

1. *Traumatic Types.*—Stretching or laceration of the sacro-iliac ligaments may follow a blow, a kick, or a fall, a wrench of the spine, or some strenuous effort to lift a heavy object. (Strictly speaking, too, those instances following difficult parturition, with rupture of ligaments, fall into this same category.)

Cases of this nature constitute some of the most severe examples of so-called "traumatic lumbago," but, barring their sudden onset and greater initial intensity, they differ in no wise in their symptomatology from those types which arise gradually and insidiously in sequence to some static disturbances.

2. *Static Types.*—In these, which constitute the majority, the condition develops in consequence of some slight persistent or oft-recurring strain of one or both synchondroses. Very commonly this is brought about through some *static* disturbance, which, whatever its site or nature, leads to alteration of pelvic inclination and abnormal tilting of the sacrum, with, of course, additional strain on the binding ligaments.

As a *predisposing* factor it is, we think, significant that many of these subjects show a general lack of muscular and ligamentary tone, as evidenced by *weak or pronated feet, round shoulders, villous arthritis of the knees*, and so forth.

The importance of this general atony resides in the fact that the maintenance of an erect position is very largely a matter of muscular action. In persons of relaxed fibre, condemned by occupation to stand for long periods, the muscles give out, and so they instinctively fall into the evil habit of substituting *ligamentary* for muscular support.

Now, the stability of the sacro-iliac joints largely depends on the related muscles and ligaments, and when we reflect how great a strain falls on these structures, not only in the maintenance of the erect position, but also in the sitting posture, we see how in persons of atonic musculature the supporting muscles are very apt to give way, and the ultimate onus of weight-bearing falls on the sacro-iliac ligaments, which under such circumstances are subjected to overstrain.

It is now necessary for us to discuss more in detail other causal mechanical factors, such as static deformity or disproportion of the lower extremities, disturbance of the normal relationship of the spinal curves, and intrinsic pelvic abnormalities.

Static Foot Errors.—Clinically we often find that with *pronated or flat feet* a secondary backache ensues in consequence of the static disturbance produced in normal weight-bearing.

Women who wear high-heeled French shoes frequently develop pronated feet, and through the faulty attitude and forward inclination of the pelvis thus induced undue strain is thrown upon the sacro-iliac ligaments, with consequent backache.

Such subjects may or may not complain of their feet, but in all instances *the combination of foot and back pain* is extremely suggestive of a static derangement. Moreover, it is important to grasp the fact that it is even more common in cases where the flat-foot is of slight degree, and sinking of the arch only noticeable on standing.

Similar lumbago-like troubles may be due to *asymmetry of the lower extremities,* absolute equality in the legs being exceptional. The static disproportion of the lower limbs, of course, gives rise to a more or less marked exaggeration of pelvic inclination, with lordosis. While such asymmetry may produce no symptoms, it frequently happens that the subject, if run down, begins to suffer more or less from backache. This, like flat feet, may often be overlooked, and the patient's lumbar pain ascribed to constitutional causes, and needless lengthy courses of spa treatment and dietetic penances inflicted.

Morton states that, in the United States, surgeons, when examining candidates for military pensions, noted that a great many based their claim on account of disabilities produced by "lumbago," the condition being attributed by them to exposure or traumata contracted during the war for the Union.

In nearly all the cases asymmetry of the lower limbs was found to be present on measurement. It had not been previously recognized, and it seemed highly probable that this static de-

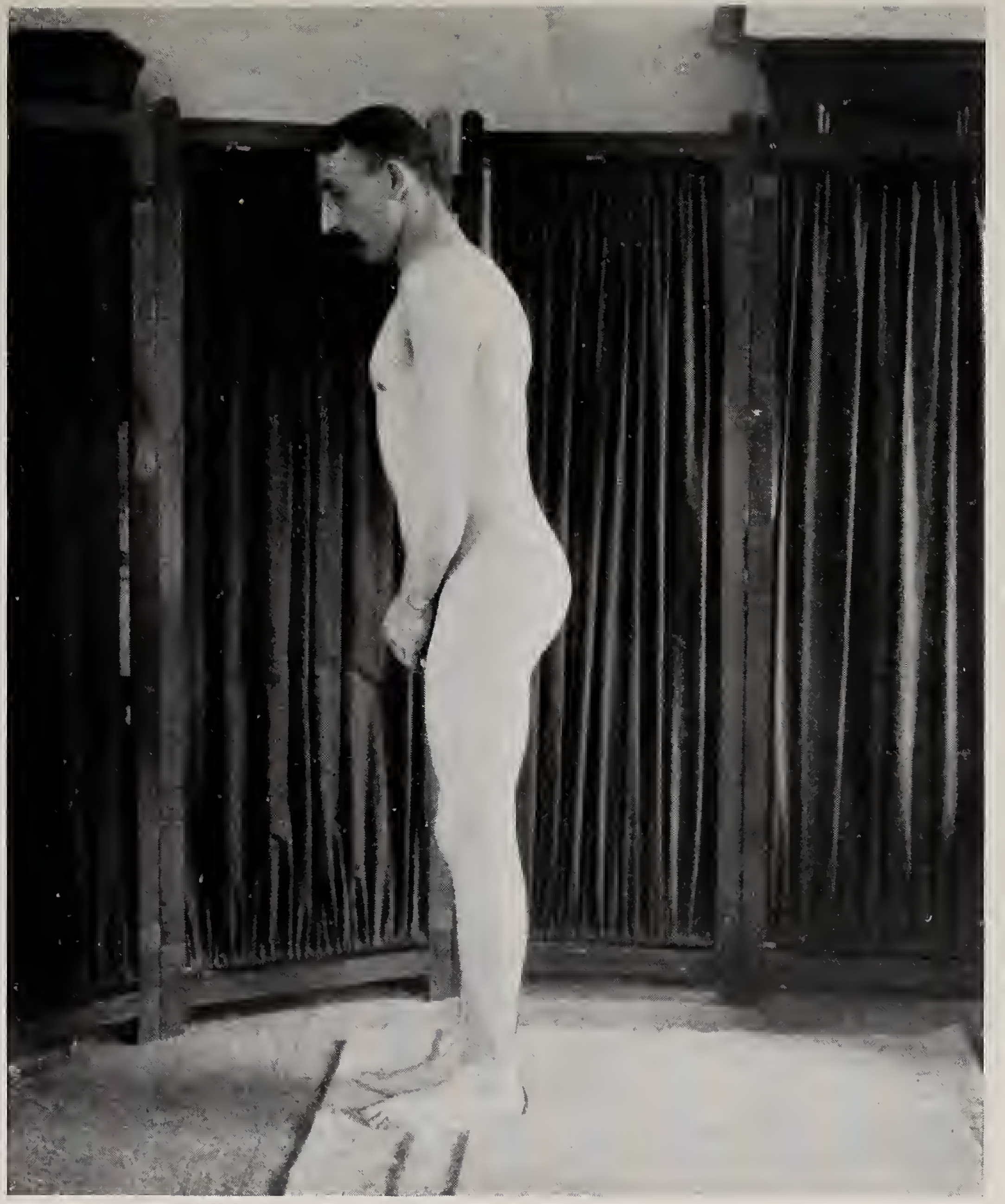


FIG. 129.—Exaggeration of normal lumbar curve in sacro-iliac strain.

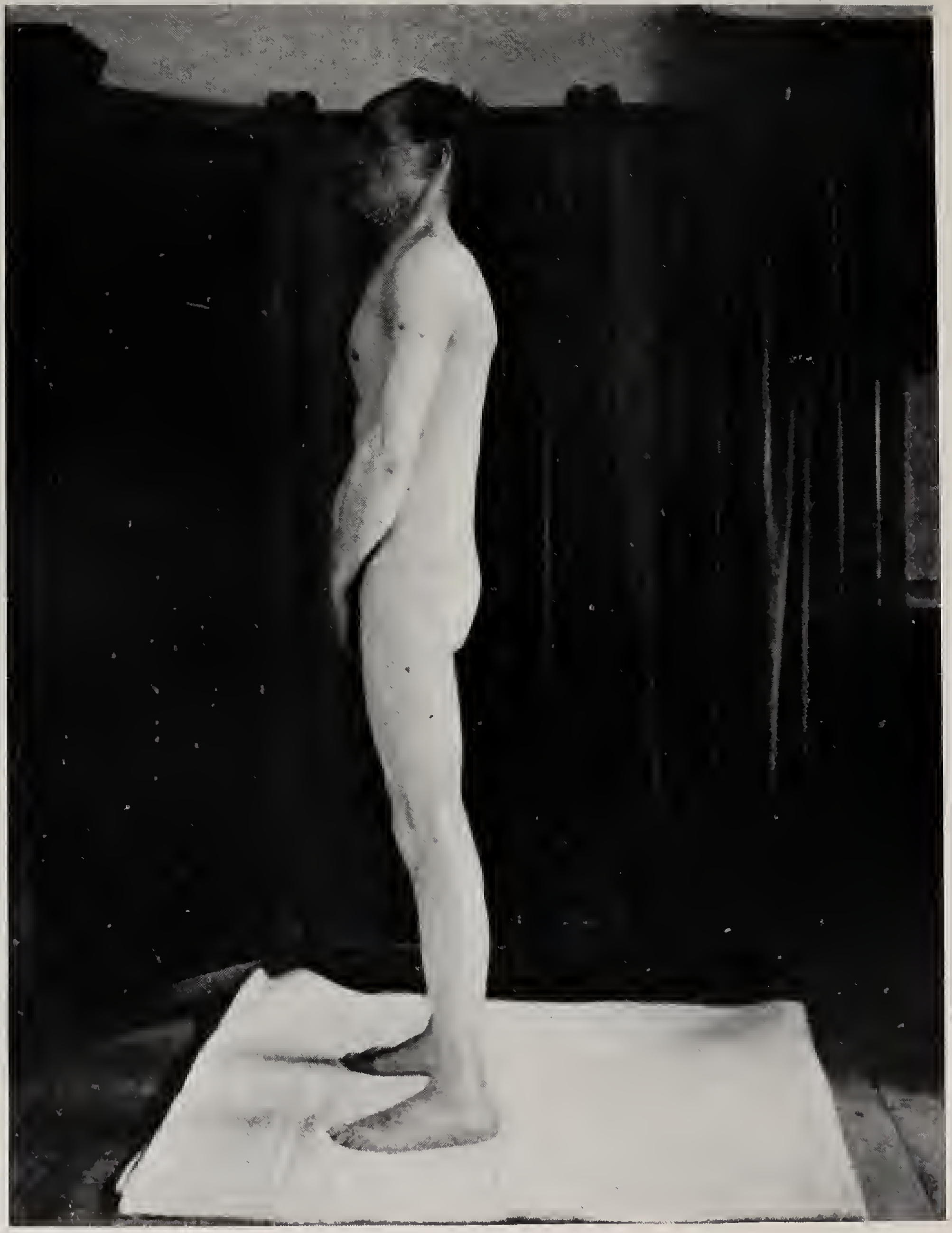


FIG. 130.—Obliteration of normal lumbar curve in sacro-iliac strain.

To face page 660.

formity was the cause of their symptoms, the circumstances of war having only determined their onset.

Again, the same static backache may develop as the result of a *malunited fracture with shortening*, or, for instance, in *hip mischief*, when, on account of muscular rigidity, the thigh is slightly flexed with secondary lordosis.

In all cases, therefore, of obscure backache we would urge the advisability of excluding *flat feet and static disproportions* in the lower extremities.

Alteration in the Normal Relationship of the Spinal Curves.—This is also a frequent cause of strain of the sacro-iliac ligaments, and its influence may be exerted by the production secondarily of an exaggeration or diminution of the normal lordotic curve.

Thus, *lordosis* of variable grade often develops secondarily to the dorsal kyphosis that accompanies *round shoulders*. Such subjects are generally of deficient musculature, and the even balance of the body being disturbed, strain is thrown upon other parts, notably the sacro-iliac joints.

In our experience symptoms are more likely to arise when their occupation tends to accentuate their dorsal kyphosis. Thus, it is common in men who have to stoop for long periods, such as labourers, and also in tailors, who sit with trunk acutely fixed. The maintenance of such a posture obviously puts great strain upon the pelvic articulations, hence stretching of the ligaments ensues.

Again, *obesity*, too, especially if of sudden development, may be the cause of a similar static lumbago, and is especially prone to occur in women at or near the menopause. With it is, of course, associated a variable degree of lordosis, this faulty attitude being instinctively adopted in order to bring the centre of gravity into line with the centre of support. One sees the same position assumed by the subjects of large abdominal tumours, in whom also similar lumbago-like troubles sometimes develop.

Faulty corsets of the so-called "straight-front pattern," accentuating as they do the lumbar curve, apparently predispose to strain of the sacro-iliac ligaments.

Like the reverse condition, exaggeration, *a diminution of physiological lordosis* may be the cause of sacro-iliac weakness.

Such obliteration of lumbar lordosis has been noted to follow *prolonged anæsthesia*, or an extended illness, enteric fever, or cases of *fracture of the leg treated by extension*.

The explanation, presumably, is that in consequence of the long-continued recumbency physiological lordosis has gradually diminished, and, when the erect position is subsequently assumed, strain of the sacro-iliac ligaments ensues.

Rachitic and Other Abnormal Types of Pelvis.—These are also predisposing causes of strain and sacro-iliac relaxation.

The rachitic pelvis, as we know, is rotated on its transverse axis, hence the marked lordosis which is present in severe examples. Owing to the exaggeration of the lumbar curve, the sacro-iliac ligaments during the erect position are subjected to much strain, hence the backache.

In support of this, it has been noted that in the subjects of rachitic pelvis the supervention of pregnancy is more likely to induce sacro-iliac relaxation. Apart from this it is quite clear that in the presence of other static deformities—*e.g.*, flat feet—secondary backache is more likely to result in persons with such a malformed type of pelvis.

In reviewing the foregoing etiological factors, it will be seen that they all exert their influence through the medium of *altered pelvic or sacral inclination, with its associated erroneous deflection of body-weight.*

Now, if we again recall the fact that the sacro-iliac synchondroses are true joints equipped with fibro-cartilage and synovial membrane, and withal almost entirely dependent on *muscular and ligamentary support*, it is clear that they are at least as liable as other articulations to suffer from the effects of sprains or strains. Such eventualities are, of course, all the more possible in view of the established fact that, even in the normal individual, movement exists at the level of these joints.

In the more severe cases a state of articular incongruence results, owing to *slipping or subluxation* of the sacrum backwards upon the ilium. In many cases, however, it is impossible to detect any actual displacement of the auricular surfaces, and apparently there is no constant relationship between the severity of the symptoms produced and the degree of relaxation.

Clinical Account.

To appreciate the significance of the varied symptomatology, it is necessary that we should be familiar with the important nerve relationships of this joint.

It is innervated by the superior gluteal, the lumbo-sacral cord, the first sacral nerve, as well as the first and second posterior sacral nerves. The lumbo-sacral cord and the obturator nerve are in especially intimate relationship, passing as they do downwards directly in *front* of the articulation.

From these relations it will be readily understood how in sacro-iliac relaxation pain is felt over the sacral region (upper sacral nerves) and in the buttock (gluteal nerve).

Pain also is frequently complained of in the hip or knee joint, and along the inner part of the thigh (obturator nerve).

In others it is present in the calf and the back of the thigh, with twitching of the muscles of these parts (lumbo-sacral cord and its connection with the great sciatic nerve).

Mode of Onset.—In the *acute* traumatic types this is, of course, fulminantly abrupt, a feeling of intense pain being immediately felt over, usually, *one* sacro-iliac joint.

In pregnancy, too, its development may be distinctly rapid, and in some instances after parturition the symptoms manifest themselves suddenly when the patient first rises.

In the more *chronic* types of static origin the installation of the affection takes place gradually and insidiously.

Thus, to begin with, the backache is only occasional, and in women may be only obtrusive at their menstrual periods. Or it may be felt at first only on rising from a sitting posture, when, if a few steps be taken, it diminishes, but returns again in an aggravated form if they stand or walk for any length of time.

Especially is it likely to arise if they stand with their loins strongly arched forwards, or sit stooping forward with the curve reversed, both of which positions entail strain on the sacro-iliac ligaments.

Goldthwait, who has written so clearly on this subject, has noted that occasionally the attacks of backache are determined by some jar or false step, in which the muscles supporting the articulations are taken by surprise.

In this event the subject experiences a distinct sensation of something slipping or giving out, and " the leg may actually give way just as the knee-joint locks or gives way with a loose cartilage."

Subjective Symptoms.

The most prominent of these is, of course, pain, which may be localized or referred in character. It varies greatly in intensity, being more severe in cases of traumatic origin, when it may be excruciating, as is also the case in some instances where it arises after pregnancy or parturition.

In the latter condition, as Trousseau pointed out, it is often more a feeling of distressing debility rather than real pain (*une faiblesse pénible qu'une véritable douleur*) which is elicited when the patient attempts to walk.

Apart from infinite gradations in severity, the salient feature of both the local and referred pains is their *intermittency*. They swiftly appear on the adoption of certain postures or movements involving strain of the synchondroses, and as swiftly disappear on change of attitude or cessation of motion, peculiarities clearly suggestive of their *mechanical* or *static* origin.

Local Pain.—This is commonly situated over the upper portion of one or both sacro-iliac joints, or referred to the sacral or coccygeal region. In the traumatic types it is usually *unilateral*, but in cases following pregnancy and other static causes pain is experienced in *both* synchondroses, and sometimes also at the pubic junction.

The sacrum being the keystone of the great pelvic arches, it is clear that certain postures and movements must tend to aggravate this sacral pain. Thus, going up and down stairs, turning in bed, or stooping frequently initiate or determine an exacerbation of backache.

Moreover, inasmuch as these joints are very largely dependent for their stability on muscular support, they can rarely sit or stand for long bolt upright with their lumbar curve obliterated. For, as the muscles fail through fatigue, the strain falls on the relaxed ligaments, and more or less displacement with pain follows. In the same way sacral pain is educed or accentuated if they lie flat on their backs, for under such circumstances physiological lordosis disappears, and the sacro-iliac ligaments undergo stretching. The relaxation of the muscles during sleep brings about the same result, hence the frequency with which they are awakened at night, this nocturnal exacerbation often being held indicative of the "rheumatic" origin of their disorder.

Referred Pains.—The localized or sacral pains usually antedate by a variable period the appearance of those radiating along the related nerves. The latter constitute a very distinctive feature of the affection, and are a common source of diagnostic fallacy.

They are more characteristic of cases of *unilateral* distribution, especially those definitely due to *trauma* or strain, and therefore more commonly attended by slipping or subluxation of the joint. Generally they are referred along the course of the *sciatic* nerve, whose position in front of the articulation renders it very liable to traction or pressure through slight displacements in the auricular surfaces. It is usually more marked on one side than the other, and may express itself by pain or paræsthesiæ referred to the back of the thigh or calf.

At other times pain is referred to the *gluteal* region or to the area of distribution of the *small sciatic* nerve.

In one instance under our care the most intense pain was referred to the region of the ischial tuberosity and perineum, and was presumably due to irritation of the *inferior pudendal* nerve.

In other cases it was referred quite definitely to the hip, and more rarely to the lower part of the abdomen and groin.

Dunlop in regard of this abdominal pain, which may be of uni- or bi-lateral distribution, attributes it to involvement of the *accessory obturator* nerve. As he states, this trunk in one out of three or four persons pursues an irregular course, passing over the sacro-iliac joint and iliacus muscle to emerge on the thigh over the pubic ramus.

In one instance under our care there was present pain on the right side, radiating from the flank over the front of the abdomen in the region of the iliac fossa, and we were led to the following conclusions regarding its origin. The subject was a sedentary man, who on observation presented round shoulders, with a sagging abdomen and lordosis. The pain, for which he had consulted several physicians, had been referred to appendicitis or renal calculus, the latter of which was excluded by skiagraphy.

To our mind it appeared to be intimately connected with his faulty attitude—a view confirmed by its amelioration and disappearance on correction of his vicious pose.

Its track was along the *ilio-hypogastric* and *ilio-inguinal* nerves, both of which, as we know, traverse the substance of the psoas muscles.

Now, owing to his primary dorsal kyphosis, he had developed a compensatory exaggeration of his lumbar curve, this being accentuated by his tendency to abdominal obesity. To maintain an even balance in such circumstances involved great strain upon the psoas muscles, which at the same time were overstretched, this leading to irritation of the above-mentioned nerves.

But, to conclude, in addition to more definite kinds of pain, vague sensations of tiredness and weakness in the back and legs are often complained of, and in long-standing cases a marked degree of neurasthenia is superadded.

Objective Phenomena.

From the nature of the lesion it is quite clear that, if severe, it must determine considerable alterations in the gait and attitude.

Severe Types.—Thus, when due to trauma of violent character and attended by rupture or tearing of ligaments, the pain is of such crippling intensity that the victim is compelled to remain in the recumbent position.

In these cases actual *subluxation backwards* of the upper part of the sacrum has been observed. This is the most common malformation; but Goldthwait has noted *unilateral* subluxation of the sacrum backwards, and in isolated instances backwards and downwards.

Equally severe disabilities are sometimes present in cases arising after pregnancy, and in such all three pelvic articulations are the seat of abnormal mobility.

Standing or walking may be utterly impossible, and any movement in the thighs or legs reverberates in the affected joints, and to procure any surcease from pain absolute passive recumbency alone avails.

If attempts are made to rise, great distress is produced, the patients feeling as if they were rent in twain, and they may actually become doubled up.

Even sitting may be impossible without leaning the elbows on the table, and progression is only feasible with support on both sides. If walking can be accomplished, the gait is waddling, the subject leaning to the left or right as one or other leg is advanced. Unless upheld by the arms, it may happen that, when in walking one leg is momentarily raised from the ground, the other limb is apt to collapse through inability to support the entire weight of the body.

Mild Types.—Apart from these severe examples following injury or pregnancy, the milder forms also show distinctive postural abnormalities.

What is more, even in these cases, if distinct relaxation of the ligaments has been produced through strain or general lack of muscular and ligamentary tone, subluxation of varying degrees may ensue.

Postural Abnormalities.—On inspection, the subject is often seen to stand in a stooping position, with the trunk showing a list to one or other side. This *lateral deviation* only occurs in instances where one synchondrosis is alone affected, and it is often accompanied by a compensatory curve in the dorsal column.

The erector spinæ on the affected side commonly stands out prominently, owing to its spasmodic contraction, this being especially noticeable on attempts at movement of the spine.

Antero-posteriorly, an *obliteration of the lumbar curve* is frequently observed, but it may be exaggerated. In the former instance we have seen the sacrum appear unduly prominent, and in the latter somewhat flattened; but often the contour of this region is unaltered.

On palpation, there will usually be found *tenderness* over one or other sacro-iliac joint, with maybe slight swelling. Such local sensitiveness or fulness over the articulations may also sometimes be detected by vaginal and rectal examination.

When there is definite displacement or subluxation, the re-

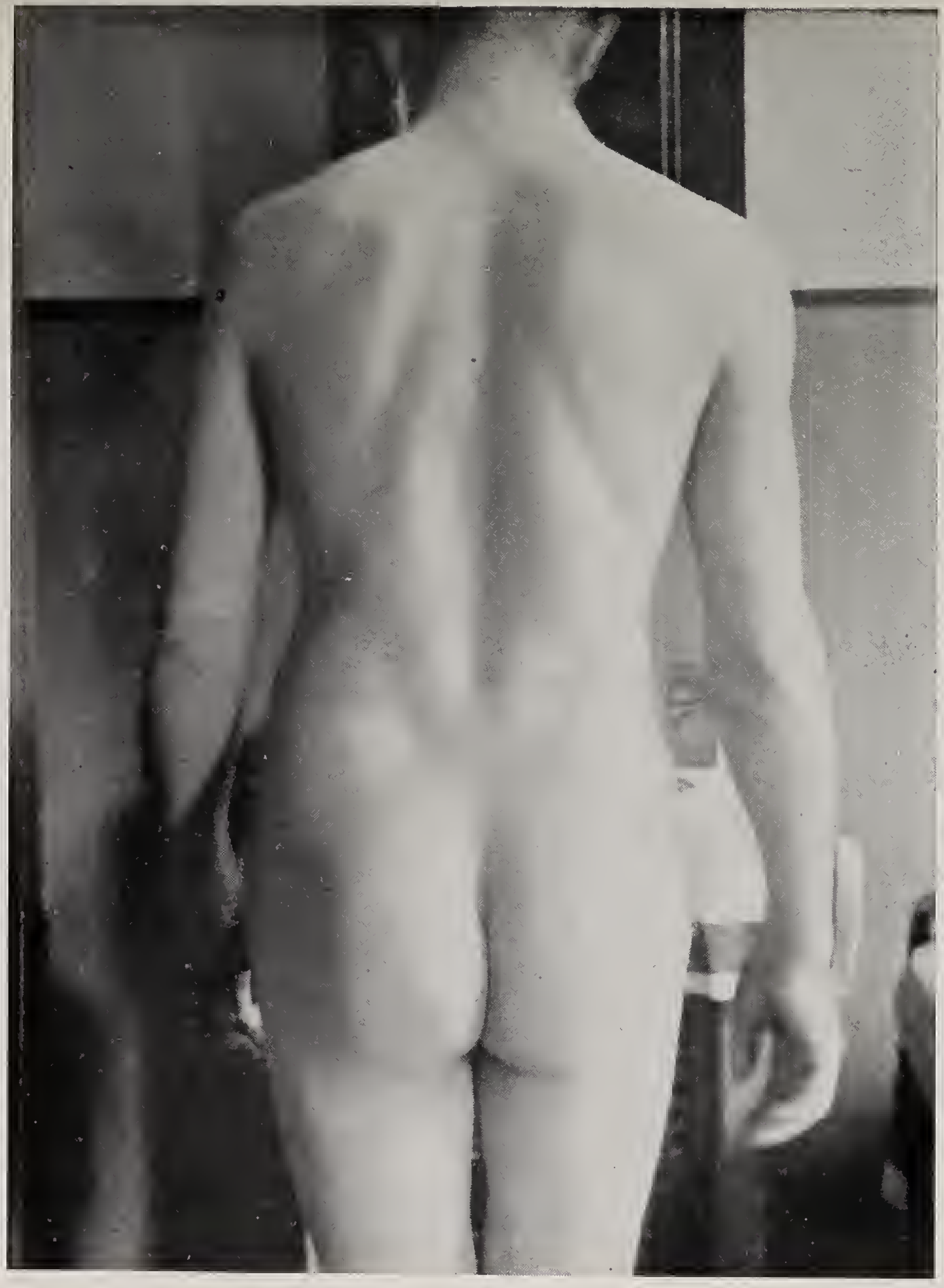


Fig. 131.—Relaxation of left sacro-iliac joint. Note list of trunk to right side.

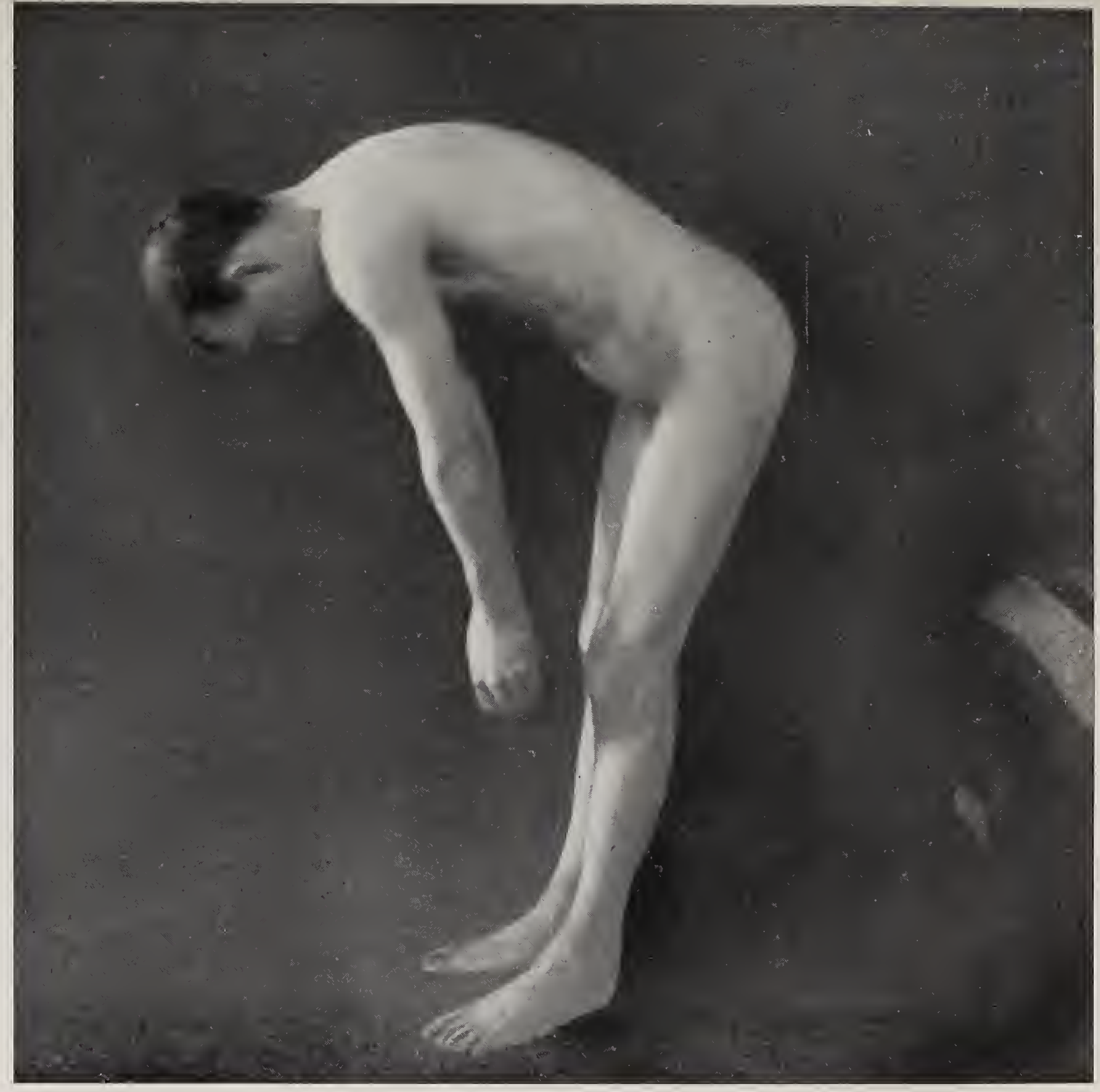


Fig. 132.—Relaxation of left sacro-iliac joint. Note that on anterior flexion of column normal physiological lordosis is only partially obliterated.

lationship of the posterior superior iliac spines may be altered, one or other protruding slightly through displacement backwards of the ilium upon the sacrum.

Disorders of Mobility.—To the great disabilities in the most severe forms we have already alluded, but those met with in the milder varieties are equally distinctive.

Thus, in the anxiety to prevent motion, the pelvis and lower part of the spine are instinctively immobilized, and all movements undertaken very warily. The patient, if he stoops, usually bends the knee, and lists to the affected side, often clinging at the same time for support, if he can, to any adjacent object.

It may be quite impossible to bend forward with the knees extended, owing to the *spasm induced in the hamstrings*, for these muscles are attached to the ischial tuberosity, and when rendered tense the pelvic wing on that side is pulled upon and the sacro-iliac joint irritated; hence their reflex contraction.

Flexion of the spine with the knees bent is more easily performed, as extension of the hamstrings does not ensue to the same extent, and so spasm is avoided.

For the same reason, when the patient is recumbent, if the thigh be flexed with the knee extended, similar spasm of the muscles, with referred pain along the sciatic nerve, is experienced, but with the knee *bent*, flexion of the thigh does not accentuate the pain.

The hamstring spasm, as Goldthwait has pointed out, is sometimes reflected in the gait; for while flexion of the knee in progression is uninterfered with, spasm ensues as the leg is straightened, leading to its sudden and convulsive backward withdrawal, reminding one very much of the peculiar spasmodic action of the hind-leg in horses suffering from stringhalt.

Abduction or outward rotation of the thigh is not so likely to cause pain as extreme *adduction* or *inward rotation*, the latter tending to separate the auricular surfaces.

Lateral flexion of the lumbar column is restricted, and in unilateral types is far more marked when the inclination is *away* from the affected side, owing to the defensive spasm induced in the erector spinæ and lumbar muscles on that side.

Where both synchondroses are involved, lateral deviation to either side is limited in range.

All the above movements can, however, be performed *if the pelvic girdle is firmly held*, especially if the motions be accomplished passively.

Course of Disease.—If the condition arises during *pregnancy*, it tends to increase up to the time of parturition, after which, in the majority of cases, it rapidly disappears.

If due to *trauma*, the cause of the disease will depend on the severity of the lesion, and on whether or no subluxation, if present, can be satisfactorily reduced, and any tendency to recurring displacement prevented by fixation.

Where the disorder is merely a local manifestation of *general lack of muscular and ligamentary tone*, the course will depend upon how far this, as well as the faulty postural attitudes with which it is generally associated, can be corrected.

In cases which arise secondarily to *static deformities or disproportion in the lower extremities*, the outlook will depend upon how far these admit of adjustment with restoration of the normal balance.

In some instances, as Goldthwait has pointed out, the condition tends to persist despite the most careful treatment, and he suggests that in such the instability of the pelvic joints is perhaps attributable to a developmental anomaly.

Terminal Changes.—As to the ultimate modifications that may ensue in the joints in obstinate or untreated cases of sacro-iliac relaxation, we believe that they are identical with those met with in the hip and knee as a result of similar *incongruence of the articular surfaces.*

Normally speaking the sacro-iliac joint is congruent, but with the constant or recurring displacements the accurate coaptation of the articular surfaces is disturbed. As a consequence the capsule and ligaments are subjected to undue strain or stretching, and it can hardly be doubted that the underlying synovial membrane with which these joints are furnished undergoes irritation, with perhaps villous proliferation.

For, as Goldthwait and others have remarked, sudden attacks of stabbing pain, with sensations analogous to those typical of " locking " in the peripheral joints, sometimes occur. Ultimately, under the influence of constant slight strains, the intervening fibro-cartilage becomes thinned, and marginal exostoses make their appearance.

In conclusion, we would urge that greater attention be paid to these mechanical lesions of the sacro-iliac joints, for undoubtedly their frequency is under-estimated, and the symptoms produced but too commonly confused with lumbago, sciatica, and other affections.

Diagnosis.

A careful analysis of the previous history and a thorough physical examination, especially from the point of view of general configuration and habitual attitude, are of prime importance.

The cases arising during *pregnancy* or after labour can scarcely

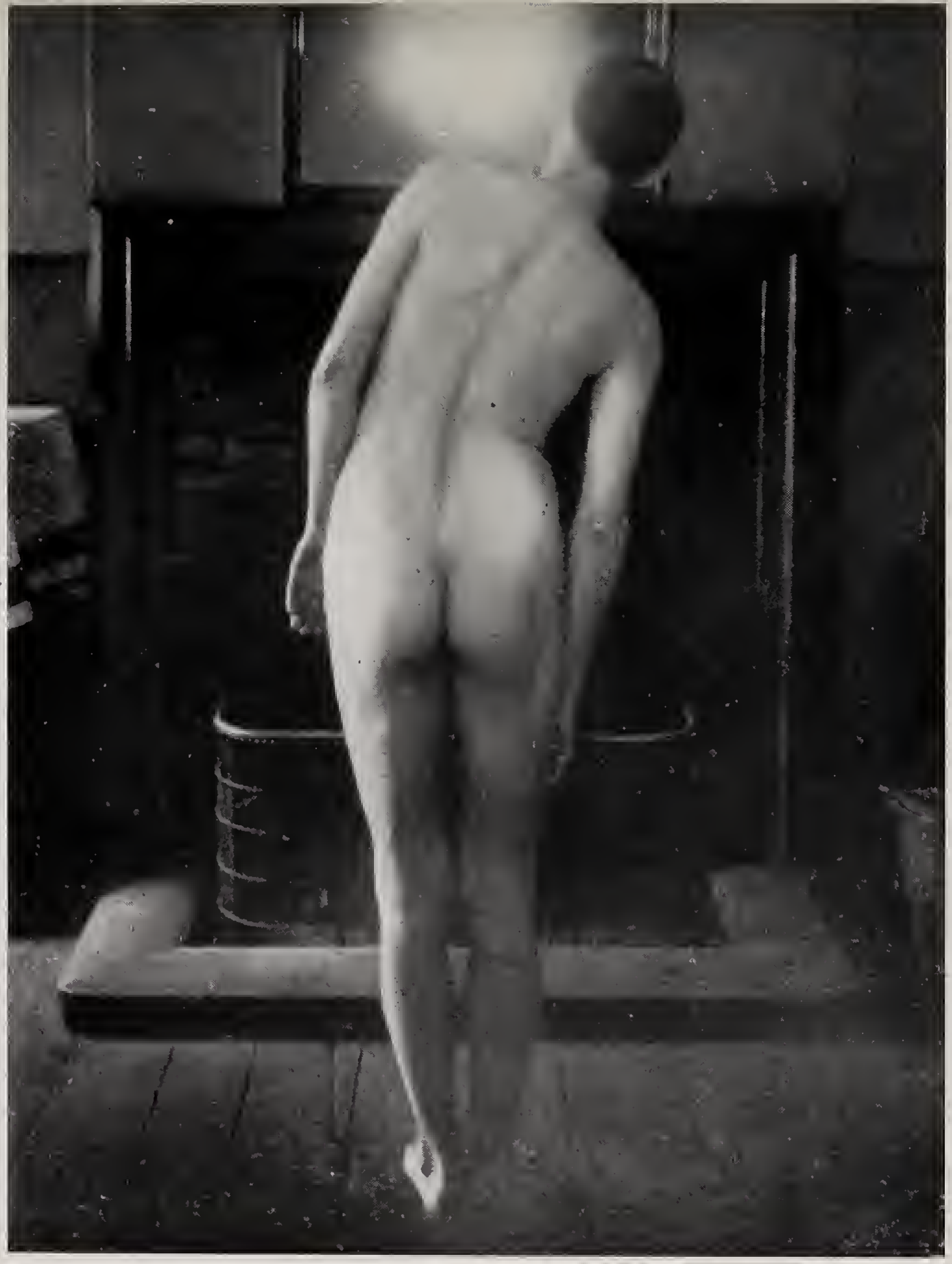


Fig. 133.—Relaxation of left sacro-iliac joint. Note lateral flexion to right—viz., *away* from the diseased side—much restricted. Note also prominence of left erector spinæ from spasm.

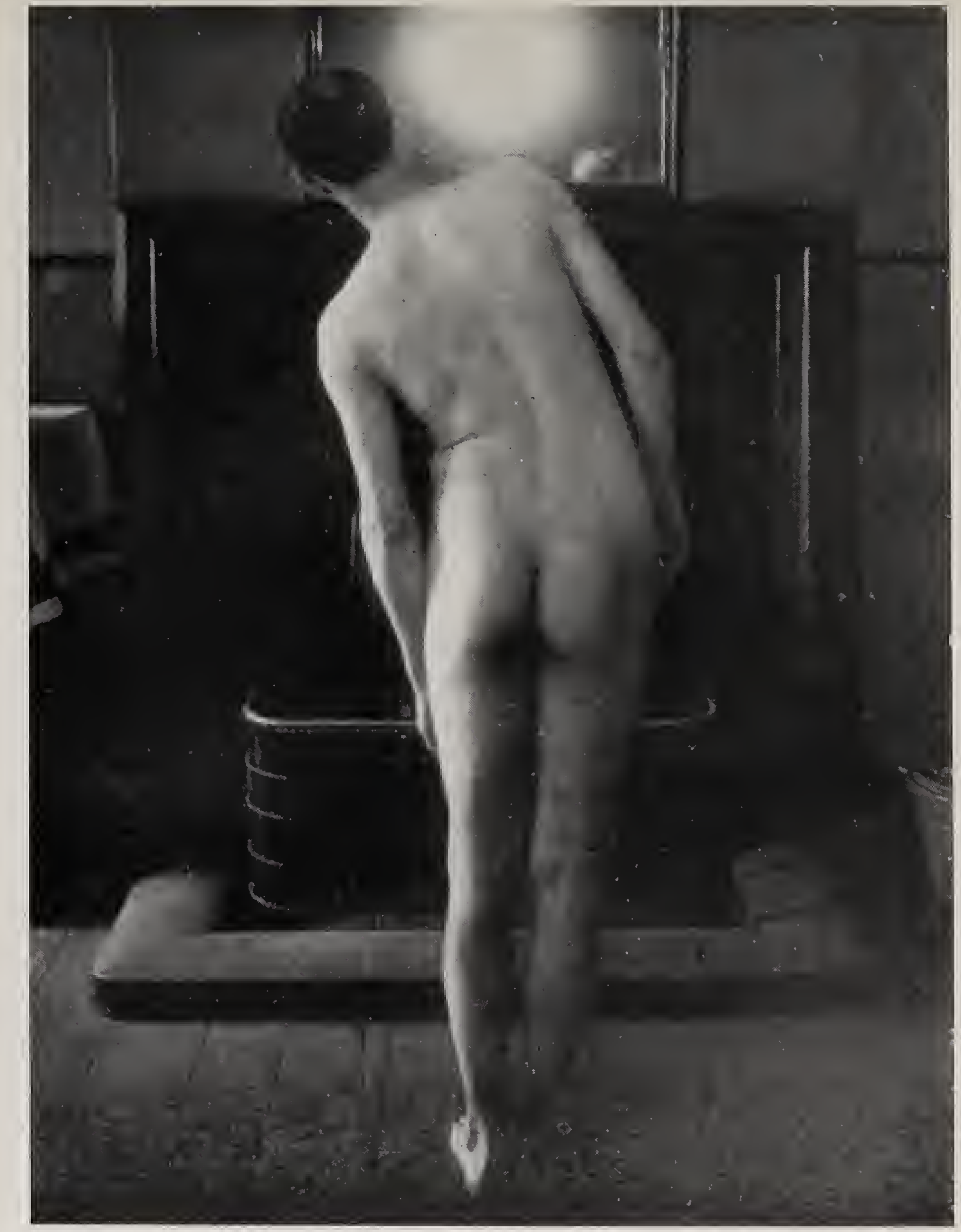


Fig. 134.—Relaxation of left sacro-iliac joint. Note lateral flexion *towards* diseased side unrestricted. *Vide* creases at loin angle.

To face page 668.

be misinterpreted; but obstinate backache in spinsters, aggravated at the menstrual periods, should also suggest the possibility of sacro-iliac relaxation.

Other facts to be elicited are the occurrence of *trauma,* either direct or indirect, or the recent occurrence of some illness liable to be followed by general lack of tone.

The question of *occupation* should also be entered into, whether it involves the habitual maintenance of some position calculated to overstrain these articulations.

The *pose* of the individual should also be noted, and in this connection the etiological significance of *round shoulders, excessive or diminished lordosis, and obesity* should not be overlooked.

Lastly, the lower extremities should be thoroughly examined from the point of view of *flat feet or static disproportions*, not forgetting also that the clue to many of the milder cases is often improper foot-gear or faulty corsets.

Subjective Symptoms.

Local pains situated over the sacro-iliac synchondroses or sacrum are complained of.

Pains referred along the sciatic nerve or to the gluteal region, hip-joint, or ischial tuberosity are present.

Both types of pain are intermittent, and are aggravated or relieved by certain attitudes or movements.

Objective Signs.

Tenderness over one or both synchondroses, with occasionally swelling, is found.

Altered Spinal Curves.—Antero-posteriorly, *obliteration of the lumbar curve* is the most common, sometimes with undue prominence of the sacrum, but occasionally *marked lordosis*, with flattening of the sacrum, is present. The sacral contour is frequently unaltered. Lateral deviation in unilateral cases is towards the *affected* side. The erector spinæ on the same side is often spasmodically contracted.

In unilateral cases, standing on the affected limb alone is difficult, or may be impossible, and in severe cases often gives rise to great pain.

If the patient be placed prone on a couch, and *hyperextension* of the thigh be attempted, it may be found restricted or painful, or impossible of performance.

Tests for Abnormal Mobility.—If, when the patient is standing, the iliac crest be grasped from behind, a rocking may be appreciated on one or both sides, as the ilia are moved away from the sacrum.

If, while the patient is erect, one hand be placed on the sacrum and the other over the pubis, the movement of the affected wing may be felt as the patient raises first one knee and then the other, and we have in several cases heard concurrently a slight clicking noise.

If the patient, while lying on his back with knees extended, be told to raise first one leg and then the other, it will be found in unilateral examples that the leg on the affected side cannot be raised as high as the other, owing to the induced spasm of the hamstrings.

It is often impossible to satisfactorily elicit this preternatural mobility, and the diagnosis of the lesion will then depend on the pain experienced over the joint when subjected to strain, and by the existence of the other clinical phenomena before described.

The presence of the foregoing signs should enable us to arrive at a decision as to the locality of the lesion, but as part of our diagnosis we should exclude *tuberculous disease*, *osteo-arthritis*, and *infective arthritis* of the sacro-iliac joint.

In regard of *tubercle*, the history and general appearance of the patient should help, while strong evidence would be gleaned from the presence of pyrexia, with swelling and tenderness over the line of the articulation, and a positive tuberculin reaction.

Osteo-arthritis is not infrequent in the sacro-iliac synchondrosis, and may possibly, as before stated, be a late sequel to simple relaxation.

The presence of osteo-arthritic lesions elsewhere in the lumbar column or peripheral joints would afford a clue, which skiagraphy would confirm.

Gonococcal and other forms of *infective arthritis* sometimes attack the sacro-iliac synchondrosis, and an acute onset associated with marked local swelling and constitutional disturbance should suggest this possibility. Confirmatory evidence would be supplied by the presence of joint lesions elsewhere, the existence of an infective focus, and the results of X-ray examination.

Skiagraphy.—All radiographers agree that examination of the sacro-iliac region presents special difficulties—at any rate, if any attempt be made to detect slight departures from normal.

Apart from the varying density and structure of the contiguous bones, which in themselves may lead to misinterpretation, we have the further mechanical difficulty, in severe cases, of arranging the patient in a favourable position for taking a clear photograph.

It is desirable always that the whole pelvis should be included in the examination, as well as the neighbouring lumbar vertebræ, as we have in this way the advantage of observing and comparing the state of both sacro-iliac joints.

Inclusion, too, of the lumbar column is necessary to exclude abnormalities of the lumbar vertebræ as well as disease of these structures.

For, as we pointed out in our section on traumatic lumbago, an *elongated fifth lumbar transverse process* may, like a similar enlargement in the cervical region, give rise to local as well as referred pains in this region.

In conclusion, having regard to the general vagueness of this nosological term, "sacro-iliac strain or relaxation," it is highly desirable that we should aim at attaining a greater accuracy in diagnosis, using this word in its etiological sense.

Thus, we all recollect that, prior to the advent of skiagraphy, the current definition of a sprain was "a wrench or strain resulting in stretching or laceration of the soft parts, without external wound"; and yet, as soon as X-ray examination became a routine procedure, how quickly it transpired that many of our simple strains or sprains were complicated by slight fractures!

We need only allude to the frequency with which sprains of the wrist or ankle are associated with fracture of the bones entering into the injured articulations.

Now, if such bony lesions, even in superficial joints, are clinically unrecognizable save by the aid of skiagraphy, how much the more likely are slight, though similar, osseous lesions in the immediate vicinity of the deeper-seated pelvic joints to pass undetected in these cases of so-called "sacro-iliac strain," especially in those the outcome of trauma!

For, discounting gross pelvic fractures, the effects of strains in these regions will probably be restricted to avulsion of small portions of bone through muscular action, or fissures of the bones without any appreciable displacement.

Unlike the limbs, we are to all intents and purposes deprived of the advantages of comparison; but, notwithstanding all these various difficulties, we are of opinion that routine examination of supposed examples of the disorder by skilled radiographers would eventually throw much light on the etiology of these cases of sacro-iliac relaxation, and incidentally lead to a clearer appreciation of the causation of many cases deemed to be the outcome merely of ligamentary strain.

Differential Diagnosis.

The disorders most likely to be confounded are lumbago, sciatica, and hip disease.

Acute Lumbago.—This affection is almost confined to middle-aged men, while sacro-iliac relaxation affects both sexes, often young adults.

The onset of lumbago is abrupt; that of sacro-iliac relaxation, unless of definitely traumatic origin, is gradual.

The pain of lumbago is more diffuse, often higher up, and invariably *bilateral;* while in sacro-iliac relaxation, save in cases following pregnancy, it is usually *unilateral.*

It is relieved by lying on the back, whereas in sacro-iliac relaxation it is aggravated by recumbency.

There is *local* pain only in lumbago, though it is often followed by sciatica, but in sacro-iliac relaxation *local* and *referred* pains are present.

Stooping in lumbago is prevented by spasm of the lumbar muscles; in sacro-iliac relaxation by spasm of the hamstrings.

In lumbago, when recumbent, the legs can be passively flexed with the knees extended; in sacro-iliac relaxation, straight-leg flexion on one or both sides is limited.

In lumbago fixation of the pelvis does not relieve pain on stooping, but it does in sacro-iliac relaxation.

Tests for preternatural mobility are negative in lumbago, but often positive in sacro-iliac relaxation.

The lumbar curve is unaltered in lumbago, but obliteration or exaggeration of lordosis is present in sacro-iliac relaxation.

The course of disease in lumbago is brief—a few days; in sacro-iliac relaxation recovery is a matter of weeks or months.

Chronic Lumbago.—There is a history of recurring attacks, with the presence of *nodules or infiltrations.* Other evidences of gouty or rheumatic tendencies are present. There is an absence of all the characteristic signs and phenomena typical of sacro-iliac relaxation.

Sciatica.—This affection is much more common in old or middle-aged men of gouty habit, and is often preceded by lumbago.

The sites of tenderness in sciatica are the sciatic notch, back of thigh, or head of fibula; in sacro-iliac relaxation, they are situated over the synchondrosis or sacrum.

Pain in sciatica is more spontaneous, less dependent on movement or attitude, and relieved by recumbency. In sacro-iliac relaxation the sciatic pain is referred from the articulation, is intermittent, and definitely associated with strain of joint.

In both disorders the pain is aggravated by straight-leg flexion (Lasègue's sign), but in sacro-iliac relaxation this, like other movements, can be accomplished painlessly if the pelvis is fixed, but not so in sciatica.

With knee bent and thigh flexed, the pain in sciatica is not aggravated by abduction, but it is in sacro-iliac relaxation.

Hyperextension, adduction, or inward rotation of the thigh increases the pain in sacro-iliac relaxation, but not in sciatica.

Lateral and other deviations from normal in the lumbar column are common in sacro-iliac weakness, but less so in sciatica.

Sciatic scoliosis disappears on sitting, but the lateral deviation persists in sacro-iliac relaxation.

Tests for abnormal mobility are negative in sciatica, positive in sacro-iliac relaxation.

In sciatic neuritis the following objective signs are present: Muscular wasting, anæsthesia, and loss of Achilles jerk; but they are absent in sacro-iliac relaxation.

Hip Disease.—Limitation of hip movement in sacro-iliac relaxation occurs only when it involves strain on the pelvic synchondroses. If the pelvic girdle be fixed, all movements of the hip are unrestricted and free from pain.

In hip disease all manipulations are resisted by muscular spasm, whether the pelvis is fixed or not. No pain is produced by pressing the ilia inwards, and there is no increase in mobility. Tenderness over the hip and trochanter, muscular wasting, local swelling, and other positive signs of hip disease are present.

Treatment.

The principles of treatment in this condition involve—

1. Restoration of the normal relationship of the joint surfaces when luxated.
2. Retention of the bones in the corrected position.
3. Removal of the cause when this is possible.

The measures to be adopted in the acute types due to severe trauma will first be considered, and secondly those conditions in which the affection has arisen as the result of insidious strain or lack of tone.

Acute Types.

Rest and Fixation.—In the more severe types due to *trauma*, immediate and absolute rest in the horizontal position is the first consideration, and if subluxation has occurred, this, of course, demands replacement.

The subjects as a rule cannot lie flat on their backs, as, with the obliteration of the lumbar curve that ensues in this position, additional strain is thrown upon the damaged joint.

To lie comfortably, therefore, a firm pillow should be inserted in the hollow of the loin, and simultaneously another placed beneath the knees to lessen the action of the hamstrings.

Subluxation, when present, as before stated, takes the form of a backward displacement of the upper part of the sacrum. This may sometimes be reduced by the hyperextension of the spine that follows the insertion, as above described, of a firm pillow in the hollow of the back, and which, by raising the lumbar spine, draws into place the sacrum.

In some cases suspension or hyperextension of the spine while in the erect position may effect replacement; but in other instances direct manipulation of the parts under ether has to be resorted to.

After reduction is accomplished, retention of the bones in their proper position is, according to Goldthwait, best affected by a plaster-of-Paris jacket. This should extend well down over the buttocks, so as to obtain sufficient purchase on the pelvic bones, and, if necessary, be carried down the thigh in spica form. It should also be continued well up towards the thorax, so as to maintain the spine in a position of hyperextension, and at the same time prevent any slipping upwards, and consequent loss of grip on the pelvic girdle.

The patient should subsequently remain in bed for some three or four weeks, and afterwards a detachable jacket be used for some two or three months, during which time, however, massage and exercises should be perseveringly employed.

Subacute or Chronic Types.

These types, due to prolonged strain through *mechanical or static* factors, constitute the bulk of cases, many of whom resort to spas as sufferers from lumbago.

In approaching such cases it is well to make a comprehensive survey of the patient, his general pose and attitude, noting at the same time any tendency to round shoulders, or sagging of the abdomen, and also any diminution or exaggeration of the normal lumbar curve. We should also especially inspect the lower extremities for evidences of flat feet or villous synovitis of the knees, as there is a strong tendency to association of these disorders with sacro-iliac relaxation.

By so doing we may get very important indications as to treatment, and the correction of flat feet, the reduction of obesity,

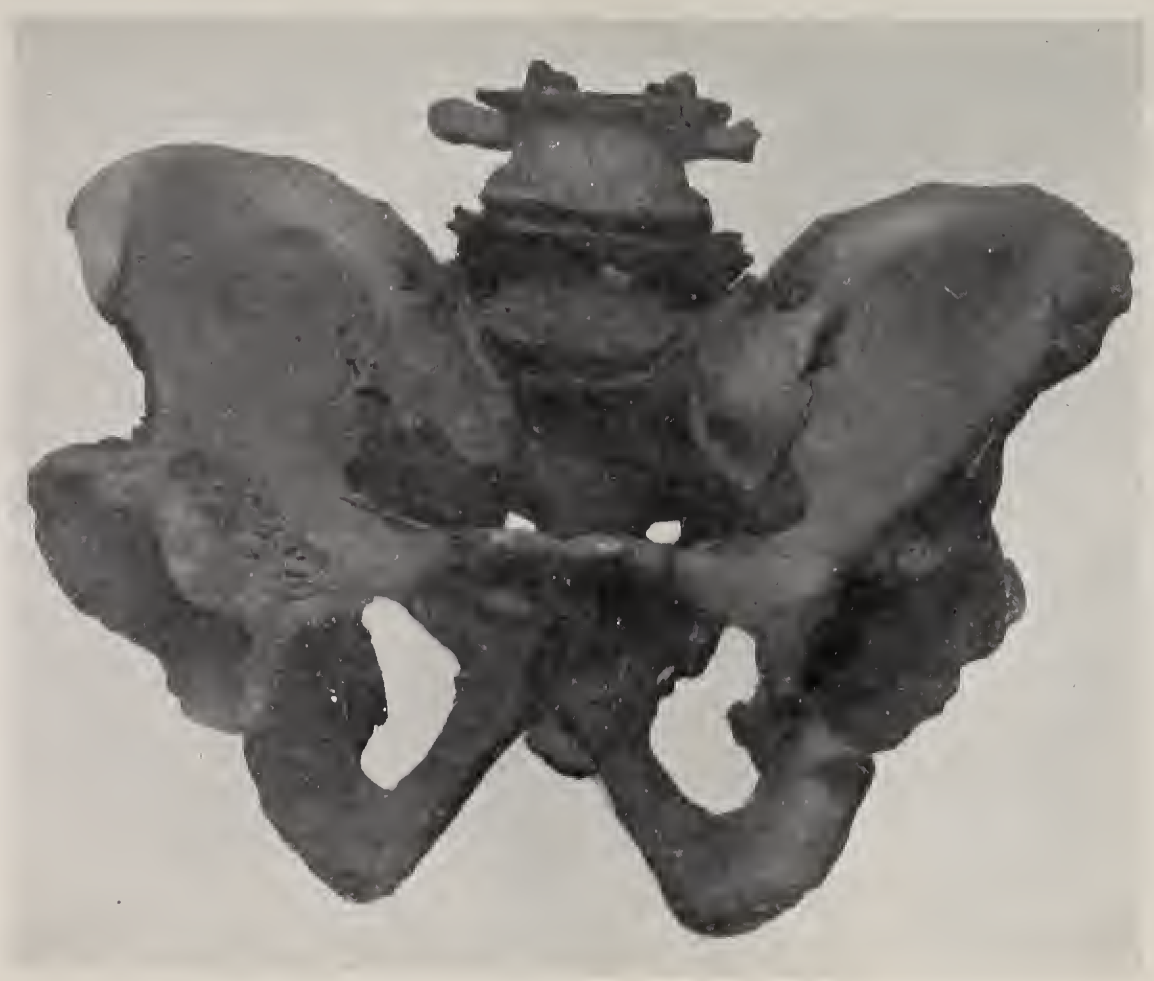


Fig. 135.—Pelvis and last two lumbar vertebræ, showing osteo-arthritic changes in both sacro-iliac synchondroses, acetabula and articular processes of lumbar segments. (U. C. H. Museum.)

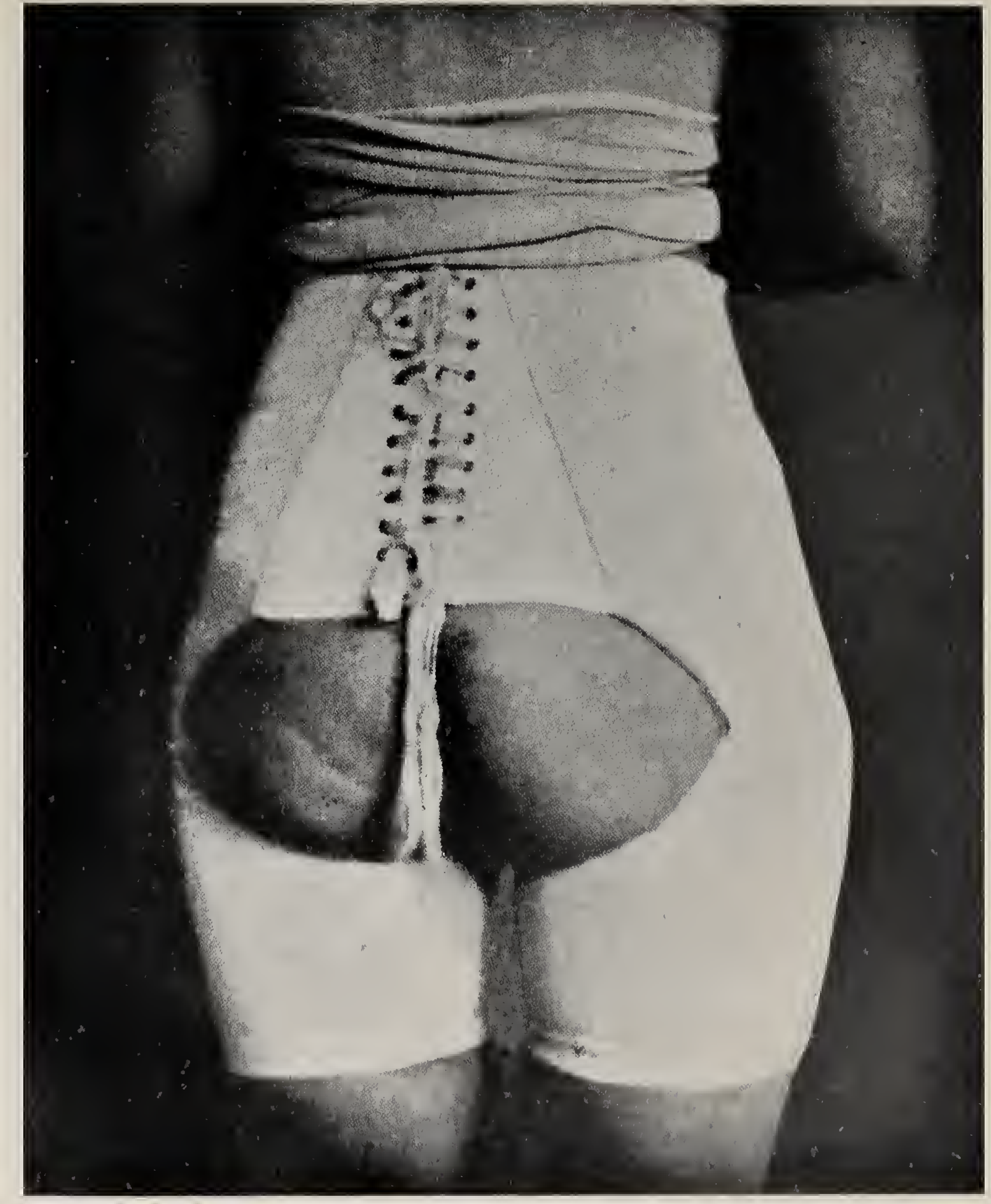


Fig. 136.—Osgood's elastic hose.

To face page 674.

and the restoration of muscular tone should be carried out on the lines previously outlined in the sections devoted to villous synovitis.

Local Treatment.—These chronic cases are subject to exacerbations, and if seen during their progress *rest* and *fixation* are, of course, indicated in this as in all other acute joint lesions.

In order to allow the stretched ligaments to regain tone, the pelvis should be immobilized by adhesive plaster. The strips should pass from one anterior spine over the back to the opposite one, and they should be carried downwards well over the sacral region, while during the application the patient's spine should as far as possible be hyperextended.

In the subacute or chronic stages the local treatment will differ according as to whether *there is or is not obliteration of the lumbar curve.*

Where *flattening* of the lumbar spine is present, it is necessary before fixation that this be first corrected by hyperextension of the spine, and subsequently a plaster-of-Paris jacket moulded to the pelvis so as to maintain the spine in the normal position.

The period of duration for which it should be worn will vary according to the severity of the lesion, and weeks or months may elapse before it can be replaced by a corset, belt, or plain strapping.

In the *less severe* forms—viz., those presenting *no flattening* of the lumbar curve, all that is usually necessary is that the patient should wear a snugly-fitting webbing belt, which may be prevented from upward displacement by perineal bands.

In women we have often found a webbing extension to their corsets, when carried low down upon the hips, act as an abdominal support, and at the same time give the necessary grip to the pelvis.

We must admit, however, that even after the most careful adjustment of a non-elastic webbing belt we have seen no relief obtained, and such cases can prove among the most intractable and tedious conditions to ameliorate.

A form of belt we have found most convenient is that suggested by Osgood, which consists of woven elastic trunks fitted about each thigh, and then about the buttocks. By means of laces or buckles the pressure round the pelvic wings can be suitably adjusted. The appended photograph, kindly lent to us by Dr. Goldthwait of Boston, will enable the reader to appreciate more clearly the mode of applying this sacral brace.

In conclusion, while all modes of physical therapy, such as hot air, the local application of radiant heat, ionization, vibratory massage, as well as local douching, are all advocated by different observers, the success obtained is variable.

This, of course, is not surprising when we have regard to the nature of the underlying lesion, and whether or no such measures be employed they must always be regarded as subsidiary in importance to the primary indication—*fixation and rest of the joint*, followed by local massage and exercises to restore that muscular and ligamentary tone on which the stability of these particular articulations is so markedly dependent.

INDEX

Abarticular manifestations, 5
Abdominal aneurysm, diagnosis of, 254
Abdominal muscles, fibrositis of, character of pain in, 267
    clinical account, 265
    diagnosis of, 268, 271
    differential diagnosis, 269
    etiology, 264
    local symptoms and signs, 266
    site of nodules in, 267
    site of pain in, 266
  involvement of, 34
  strain of, 583
Abdominal types of fibrositis, 434
Absorption, promotion of, 469, 497
Achillodynia, 571
Acupuncture, relief of pain by, 496
  surgical treatment of chronic sciatica, 531
Acute articular rheumatism, 140
    causal organisms of, 37
    overlapping of, and acute muscular rheumatism, 34
Acute generalized fibrositis, drug treatment of, 430
Acute localized fibrositis, drug treatment of, 430
Acute muscular rheumatism, overlapping of, and acute articular rheumatism, 34
Acute rheumatoid arthritis, 140
Acute rheumatism, identification of, 2, 3
Adductor muscles, strain of, 582
Adhesions, forcible rupture of, 551, 609
  rectification methods, 488
  treatment of, in bursitis, 574
    in subacute synovitis of knee, 551
Adiposity, subcutaneous, in trunk sciatica, 331
Age, and sex incidence of periarthritis, 139
  incidence, 20
    of primary sciatica, 300
  neuro-fibrositis and, 389
Aix and Vichy massage in fibrositis, 423
Alcohol, injection of, 535
  relationship to lumbago, 26
Alcoholism, diagnosis of, from crural fibrositis, 287
Alimentary canal, functional derangements of, 134
    subinfection or chronic infection from, 57
Anaerobes in digestive tract, 54
Anæsthesia in radicular sciatica, 354
  sciatica causing, 327
Analgesic applications in articular fibrositis, 436, 455, 468
Analogies between chronic rheumatism and specific infections, 31
Aneurysm, abdominal, diagnosis of, 254
  aortic, diagnosis of, 223
  popliteal, 137
  of sciatic artery, diagnosis of, from sciatica, 371
Animals, lumbago in, 236
  muscular rheumatism in, 100, 159, 161
  rheumatism in, 69
Ankle-joint, malpositions of, 461
Ankylosis, bony, 483
Anodynes, application of, in acute stages of sciatica, 515
    relief of pain by, 468, 496
Anterior tibial nerve, relation to sciatica, 311
Antiphlogistic action of radium emanation, 412
Antitoxins, 441
Appendicitis, acute, onset of acute sciatica and, 306
  cause of sciatica, 365
  diagnosis of, from fibrositis of abdominal muscles, 269
Aquapuncture, relief of pain by, 496
Arm. *See* Extremity *and under* Brachial
Arteries, changes in capillaries, 93
  degeneration in fibrous rheumatism, 125
Arteriosclerosis in chronic fibrous rheumatism, 94, 415
  in relation to sciatica, 302
Arthralgia, 31
  chronic, 452
  fixed (monarticular), 114, 136
  fleeting, clinical account, 112
    of erratic distribution, 112
    of erratic or nomadic incidence, 136
    local symptoms, 113
    mode of onset, 112
Arthralgic forms of articular fibrositis, local therapy of, 452
  of chronic articular rheumatism, 110, 112
  of fibrositis, 136
Arthritic fibrositis, sex incidence, 20, 25
  types of fibrositis, 31
      drug treatment, 430
      occupations, 83
Arthritides, infective, 4, 7
    undifferentiated, 9, 12, 90
Arthritis, atrophic, or chronic rheumatoid, 50, 145

Arthritis, chronic, groups of, 48
  forms of, referable to some specific infection, 141
  gonorrhœal, 141
  hæmophilic, 143
  infective, skiagraphy in, 147
    of undifferentiated type, 48
  non-infective types, 142
  occupations and, 71
  rheumatoid or atrophic, diagnosis of, from synovitis, 637
    skiagraphy of, 147
  secondary syphilitic, 141
  spinal, diagnosis of, 252
  static types of, erroneously regarded as rheumatic, 8
  surgical measures in, 480
  traumatic types of, erroneously regarded as rheumatic, 8
  types of, 31
  use of term, 2
  villous, of hip, local treatment, 654
Arthritis deformans of cervical column, 222
    withdrawal of, from rheumatic category, 4
Arthropathies, nerve, withdrawal of, from rheumatic category, 4
Arthroplasty, 490
Articular fibrositis, 89, 109, 452
  acute stages, surgical measures, 481
  acute types, 453
  arthralgic forms of, 452
  chronic, measures suitable for, 422
  diagnosis of, 135
  measures to promote absorption, 469
  relief of pain in, 465
  rest and fixation in acute phases, 453
  subacute stage, after-treatment, 477
    and chronic types, 472, 481
    measures suitable for, 421
    special modes of therapy, 472
    treatment by hyperæmia, 476
    types or stages, 457
  surgical measures, 480
Articular lesions in chronic fibrous rheumatism, 92
  in chronic rheumatic arthritis, 110
Articular rheumatism, acute, differential specific diagnosis, 444
  chronic, or articular fibrositis, 452
    serum-therapy in, 442
  phenomena antecedent, 35
  subacute, 144
Articulorum passio, 2
Aspirin in neuralgic types, 433
Astigmatism, cause of torticollis, 206
Atmosphere, radio-activity of, 64
Atmospheric influences in fibrositis, 61
Atrophy, muscular, treatment of, in brachialgia, 535
Attitude, habitual, 84
  in synovitis of hip, 641
  vicious, in sciatica, 336
    in torticollis, 203
  See also Posture
Auto-infection, 31
Autotoxæmia, 39, 53
  theories of, 58
Bacillus coli, inoculation of, with chronic rheumatism, 58
  microdentalis as infective origin of chronic rheumatism, 47
Backaches, significance of, 238, 247, 251
Bacteriology of infection, 46, 441, 445
Bacteriuria, diagnosis of, from chronic lumbago, 251
Barometric pressure, variations in, cause of pains in fibrositis, 63
Bath waters, analysis of, 409
Baths, fango, mud, and peat, 428, 476
  hot, in acute diffuse fibrositis, 420
  hot-air, varieties of, 426, 476
  value of, in fibrositis, 420
  vapour, in fibrositis, 423
Baume tranquille, use of, in acute stages of sciatica, 516
Bicipital bursitis, diagnosis of, from chronic brachial fibrositis, 228
Bier's treatment, 466
Biliary passages, infection of, in chronic fibrous rheumatism, 125
Bladder, rheumatism of, 289
Blood-content and excretion of uric acid, 413
Bones, disease of, in lumbago, 591, 595, 610
    in synovitis of knee, 548
  inflammatory change of, 137
  long, alterations of marrow, 93
  relationship and state of, to articulations, 487
  tumours of, pain in, 137
Bonnet's sign in diagnosis of trunk sciatica, 323
Bony processes, brachialgia and sciatica due to abnormalities, 12
Boots, defective, cause of referred pain, 283, 286
"**Bouchard,** campodactylie de," 125
Bowler's side, 583, 587
Brachial fibrositis, 216
  acute, 216, 434
    clinical account, 217
    complications of, 219
    course and duration of, 220
    diagnosis of, 220
    differential diagnosis of, 221
    systematic exercises in, 500
  chronic, 223
    clinical account, 224
    course and duration of, 225
    diagnosis of, 225
    differential diagnosis of, 226
  diagnosis of, 385
  treatment of, 434
Brachial neuralgia, 221
  characters of, 386
  clinical account, 379
  mode of onset, 380
  treatment of, 435
Brachial neuritis, 222, 381, 386
  clinical account, 381
  objective sensory changes in, 382
Brachialgia, 378
  acute stages, 533
  alcohol injections in, 535
  causes of, 11

- **Brachialgia,** chronic, 535
  - diagnosis of, 385
  - differential diagnosis of, 387
  - etiology of, 378, 387
  - external applications, 535
  - idiopathic, 38
  - local therapy, 533
  - pressure, 86
  - primary or secondary (?), 386
  - radicular types of, 383
  - relationship of, to gout, 26
  - secondary, 383
  - static types of, 12
  - subacute, 535
  - treatment of, 534
- **Brachialgias,** static, diagnosis of, from chronic brachial fibrositis, 226
- **Brine** baths, 423
- **Brissaud's** spasmodic type of sciatica, 349
- **Bursæ,** changes in, in fibrositis, 91
  - rheumatic affections of, 9
- **Bursal** affections of lower limb, 569
  - of upper limb, 554, 572
- **Bursitis,** bicipital, diagnosis of, 228
  - cause of chronic rheumatism, 41
  - causes of, 9
  - infective processes and, 557
  - of lower limb, treatment, 576
  - of upper limb, treatment, 572
  - patellar, 571
  - post-calcaneal, 571
  - rheumatic, 553, 560
  - secondary types of, differential diagnosis, 569
  - subacromial, 554
    - acute types, 558
    - chronic types, 561
    - clinical account, 558
    - course of, 560
    - diagnosis of, 566
    - etiology, 556
    - local signs, 559
    - treatment, 572
  - subcoracoid, 562
    - clinical account, 564
    - diagnosis of, 566
    - etiology, 563
    - treatment, 575
  - subgluteal, 570
    - diagnosis of, from sciatica, 368
- **Buttock,** fibrositis of, 274

- **Caisson** disease, 63
- **Calcaneal** bursitis, post-, 571
- **Calcium** deficiency, 399
- **Calculus,** renal, diagnosis of, from chronic lumbago, 251
- " **Campodactylie** de Bouchard," 125
- **Caries,** cervical, 223
    - diagnosis of, from torticollis, 208
  - lumbar, diagnosis of, from chronic lumbago, 252
- **Cartilage,** erosion of, 486
- **Catarrh,** effects of, 74
  - post-nasal, 41
- **Cattle,** acute myo-fibrositis in, 168
- **Cauda** equina, lesions of, diagnosis of, from sciatica, 346, 372
- **Cauterization,** relief of pain by, 530
- **Cephalalgia,** rheumatic, 212
  - clinical account, 213
  - diagnosis of, 214
  - site of nodules in, 212
- **Cervical** caries, 223
  - fibrositis, chronic, 208
    - clinical account, 209
    - course and remote effects, 210
    - diagnosis, 211
    - differential diagnosis, 211
    - objective phenomena, 210
  - pachymeningitis, hypertrophic, 222
- **Cervical** rib, 379, 383
  - brachialgia associated with, 12
  - diagnosis of, from brachialgia, 387
- **Cervical** vertebræ, arthritis deformans of, 222
  - malignant disease of, 223
- **Charcot's** disease of knee, 142
- **Charcot's** joints, withdrawal of, from rheumatic category, 4
- **Children,** fibrositis in, 24
- **Chill,** cause of chronic rheumatism, 19
  - excessive toil and, 80
  - pathogeny of, in fibrositis, 77
  - production of, fibrositis and, 74
  - types of fibrositis especially liable to ensue after, 77
  - wrongly regarded as sole cause of rheumatism, 3
- **Chorea,** 5
- **Chromic** acid, injections of, in chronic fibrositis, 510
- **Chronic** articular rheumatism, or articular fibrositis, 109
    - arthralgic type, 112
    - classification, 109
    - coexistence of Graves' disease with, 123
    - diagnosis of, 135
    - duration of fixation, 456
    - joint affections included under, 7
    - periarthritic type, 116
      - clinical account, 116
      - course and termination, 122
      - general symptoms, 118
      - joint lesions, 119
      - local symptoms and phenomena, 120
      - mode of onset, 117
    - pressure factor in, 127
    - prognosis of, 148
    - treatment of, 452
- **Chronic** fibrous rheumatism, 110, 124
    - benign form, 129
    - clinical features, 127
    - etiology, 126
    - fascial type, 126
    - generalized or polyarticular variety, 129
      - prognosis of, 149
      - varieties, 144
    - localized varieties, 124, 143
    - malign form—Jaccoud's type, 130
- **Chronic** interstitial fibrosis, subinfection in, 56, 58
- **Chronic** rheumatic arthritis, arthralgic type, 110
    - articular lesions, 110

Chronic rheumatic arthritis, morbid process, 109
    periarthritic type, 110
Chronic rheumatism, 5
  auto-toxæmia in, 53
  clinical phenomena suggestive of infective origin of, 39
  clothing in, 402
  conclusions regarding clinical content of, 12
  diet in, 396
  differentiation of, 3
  evidence of infective origin, 55
  experimental data in support of infective origin, 51
  gastro-intestinal derangements in, 40
  local foci of toxic absorption, 41
  morbid anatomy, 89
  primary causes, 19
  so-called, clinical content, 6
  specific infections and, 31
  substitution of term "fibrositis" for, 13
  synopsis and arrangement of subject, 14
  treatment of, 392
  urinary changes in, 44
Chronic rheumatoid or atrophic arthritis, 145
Circulatory disturbances in muscular fibrositis, 195
Circumflex paralysis, differential diagnosis of, 569
Classification of infective or toxic fibrositis, 111
Claudication, intermittent, diagnosis of, from sciatica, 370
  lumbar type of, diagnosis of, 254
Clay soil, 68
Climate, influence of, on fibrositis, 67
  and residence in treatment of fibrositis, 404
  suitable for enfeebled persons, 405
    for sedentary persons, 404
  variability of, 67
Climatic conditions, ideal, 404
Clothing, functions subserved by, 401
  in chronic fibrositis, 402
  influence of, 77
  outer layers of, considerations as to, 402
  and treatment of fibrositis, 401
Coachmen, chronic rheumatism in, 71, 74
Coal-workers, chronic rheumatism in, 65
Coccygodynia, 582
Cold applications in acute stages of sciatica, 514
    in articular fibrositis, 454
  baths, value of, in fibrositis, 420
  exposure to, and heavy labour, 80
    cause of fibrositis, 62
  influence of, on muscular katabolism, 80
Colds, effects of, 41, 74
Colon, irrigation of, 46
Compression, digital, relief of pain by, 530
Constipation, backache of, diagnosis of, from chronic lumbago, 251
  cause of chronic rheumatism, 43
  chronic, 438
Constitutional symptoms of torticollis, 202
Contracture of Hayem, apprehension, 218
Contra-lateral sign in trunk sciatica, 322
Corns, influence of weather on, 63
Counter-irritation in articular fibrositis, 468, 497
  in subacute and chronic brachialgia, 535
  in subacute stages of sciatica, 521
Coxitis, tuberculous, differential diagnosis of, 646
Cramp, muscular, 189, 191, 193
Cremasteric reflex in radicular sciatica, 376
Cricket shoulder, 579
Crural fibrositis, 277
  diagnosis of, 280, 283
  differential diagnosis, 281
  lower segment of limb or leg, 279
  upper segment of limb or thigh, 277
Crural neuralgia, anterior, 374
  clinical account, 374
  etiology of, 373
  local therapy, 533
Crural neuritis, general, 376
Cytology of joint fluids, 47

Damp, cause of chronic rheumatism, 19
  influence of, 63, 407
  soil, 68
Deformity, correction of, 483
Deltoid rheumatism, 216
  strains of, 579
Diabetes, cause of sciatica, 363
  in relation to sciatica, 302
Diabetic sciatica, 347
Diagnosis, etiological, 133
  of acute articular rheumatism, 140
  of arthralgic types, 136
  of articular fibrositis, 135
  of brachialgia, 385
  of chronic articular rheumatism, 133
  of chronic fibrous rheumatism, 143
  of generalized varieties, 144
  of infective arthritis, 141
  of joint neuroses, 137
  of periarthritis, 139
  See also Differential diagnosis
Diamines, 54
Diaphoretic measures in neuralgic types of fibrositis, 427, 435
Diaphragmatic fibrositis, 272
Diathermy in subacute stages of sciatica, 520
Diathesis, rheumatic, 28, 39, 133
Diet in acute phases of fibrositis, 395
  in chronic cases of fibrositis, 396
  in gouty cases of fibrositis, 397
  in obese subjects, 400
  in treatment of fibrositis, 395
  influence of, 42
  relationship to gout, 26
Differential diagnosis of acute articular rheumatism, 140
  of acute rheumatoid arthritis, 140
  of arthritis referable to specific infection, 141, 144
  of brachial fibrositis, 226

Differential diagnosis of brachial neuralgia, 221
  of brachialgia, 387
  of chronic lumbago, 250
  of crural fibrositis, 281
  of dorsodynia, 258
  of fibrositis, 140
  of myositic nodules, 186
  of osteo-arthritis of hip-joint, 366
  of pleurodynia, 259
  of rheumatic bursitis, 567
  of sacro-iliac relaxation, 672
  of sciatica, 366
  of spondylitis, 211
  of subacute synovitis of knee, 546
  of torticollis, 207
  of traumatic fibrositis, 544
  of traumatic lumbago, 605
  of trunk lumbago, 241
  of villous synovitis of hip, 646
  of villous synovitis of knee, 637
Differentiation of rheumatism and gout, 2
Digestion, disorders of, correction of, 437
Dogs, muscular rheumatism in, 100
Dorsodynia, 258
  differential diagnosis of, 259
Douches in articular fibrositis of subacute stage, 473
  dry massage, in articular fibrositis of subacute stages, 475
  relief of stiffness and swelling by, 475
Draughts, action of, fibrositis and, 76
Drug treatment of acute generalized fibrositis, 430
  of acute localized fibrositis, 430
  of arthritic types of fibrositis, 430
  of muscular types of fibrositis, 432
  general, of fibrositis, 429
Drugs in fibrositis, 439
Dry cupping in acute stages of sciatica, 513
Dupuytren's contracture, 131
Dysentery, cause of sciatica, 11
  complications of, 30
Dyspepsia, forms of, 124, 414

Elbow, muscles of, rupture, 580
Electrical methods in subacute stages of sciatica, 520
  in chronic or recurring forms of fibrositis, 509
  in subacute stage of articular fibrositis, 478
  treatment of chronic stages of sciatica, 524
Electricity, static, in chronic stages of sciatica, 525
Endarteritis, special form of, 93, 132
Endocarditis complicating acute myo-fibrositis, 169
  complicating lumbago, 238
  in rheumatism, 34, 36
Environment, cause of fibrositis, 73
  effects of, 19
  unhygienic, 68
"Epicondylalgia," 227
Epicondylitis or epicondylalgia, 580
Epidemic acute myo-fibrositis, 160
Epidemicity of muscular rheumatism, 33
Epidural injections in chronic stages of sciatica, 529
Epilepsy following trunk sciatica, 334
Erben's sign in diagnosis of trunk sciatica, 323
Erythema nodosum, 5
Erythematous eruptions, 34
Etiology, determining or exciting, of fibrositis, 61, 87
  general, of fibrositis, 19, 61
Etiological diagnosis of fibrositis, 133
  factors, summary of, 60
Exacerbations, determining causes of, 86
Exercise, excessive, effects of, 78, 80
  in fibrositis, 417, 418, 464
  in treatment of villous arthritis of hip, 655
  in treatment of villous synovitis, 650
  muscular, insufficient, 81
  passive, 464
  systematic, in acute muscular fibrositis, 500
Extremity, lower, bursal affections of, 569, 576
    fibrositis of, 273, 277
    lesions of, in traumatic muscular fibrositis, 585
    malpositions of, 461
    mechanism of, in chronic villous synovitis, 627
    muscles of, strain or rupture of, 582
    primary sciatica incidence, 300
    sensory changes in sciatica, 353, 358
    See also Foot
  upper, bursal affections of, 554, 565, 567, 572
    lesions of, in traumatic muscular fibrositis, 584
    malpositions of, 463
    muscles of, rupture, 579
    region of, brachial fibrositis of, 216
    See also Hand
Eye, rheumatism of, 288

Fæces, examination of, 135
Fango baths, 428
Fascial type of chronic fibrous rheumatism, 126
Fatigue, results of, 80
Feet, boots and deformities cause of referred pain, 284, 286
  deformities of, pain due to, 10
  flat. *See under* Foot
Femoral vein, thrombosis of, diagnosis of, from sciatica, 369
Femur, articular incongruence, 629, 635
  malignant disease of, diagnosis of, from sciatica, 369
Feuerstein's method, 322
Fever in acute muscular lumbago, 239
Fibrolysin, injections of, in chronic fibrositis, 510
Fibrosis, chronic interstitial, 56, 58
Fibrositis, age incidence, 20
  causes of, 39, 61
  chronic or recurring forms, 437
  combined serum and vaccine therapy of, 449
  diet in, 395, 397

Fibrositis, diagnosis of, 133
  diffuse, acute, 420
  drugs empirically administered in, 439
  exercise in, 417, 418
  hydrotherapy in, 419
  infective or toxic, 19, 109
  massage in, 417
  morbid anatomy, 89
  neuralgic types of, 435
  periarticular, 83
  prophylactic measures for, 424
  radio-active waters in treatment, 408
  serum-therapy of, 441
  sex incidence, 20
  spa treatment of, 409
  traumatic, 539, 549, 578
  treatment of, general, 392, 401, 404
  use of term, 13
  vaccine-therapy of, 441, 446
Fibrous ankylosis, 484
Fibrous chronic rheumatism, 124, 491
Fingers, contractions in fibrous rheumatism, 143
  distortion of, in fibrous rheumatism, 131
  flexion of, 128
Fixation of joint in articular fibrositis, 456
  relative or absolute, in articular fibrositis, 458
Fluids, joint, cytology of, 47
Foci, local, of toxic absorption, 41
Fogs, influence of, 66
Fomentation, hot, in articular fibrositis, 469
Food, excessive intake of, cause of fibrositis, 81
Foot errors, static, pathological factor of sacro-iliac relaxation, 660
Foot, flat-, crural neuralgia due to, 374
  pains due to, 12
  referred pain in, 283
  rigid, treatment of, 652
  sciatic pain due to, 371
  synovitis due to, 628, 633, 650
Foot, mechanism of, 627
  sensory changes in sciatica, 358
Foot-gear, proper, in treatment of villous synovitis, 650
Forearm, muscles of, rupture, 581
  myositis of, 225
Fracture, compression, of fifth lumbar vertebra, 598
  of transverse process, 597

Gait, abnormalities of, in sciatic neuralgia, 315
  alterations in, in trunk sciatica, 325
  and attitude, alterations in, in villous synovitis of hip, 641
Gall-bladder, diseases of, diagnosis of, from fibrositis of abdominal muscles, 270
Galvanism in subacute stages of sciatica, 520
Games, strains due to, 578
Gara's method, 323
Gardeners, chronic rheumatism in, 71, 74
Gastric acidity, relation of urinary acidity to, 45
Gastric acidity, dilatation in chronic fibrous rheumatism, 124
Gastrocnemius, strain of, 583
Gastro-intestinal derangements, cause of relapses, 86
  in chronic rheumatism, 40, 53
Genu valgum, 628
Glands, swollen, diagnosis of, in myofibrositis, 186
Gleet, chronic, cause of sciatica, 363
Gluteal fibrositis, 273
  anatomical peculiarities, 273
  clinical account, 275
  etiology of, 274
  objective phenomena, 276
  site of nodules in, 276
    pain in, 275
Gluteal reflex in radicular sciatica, 356
Gluteal muscle, lesions of, 586
  strain of, 582
Goitre, exophthalmic, periarthritis and, 123
Golfer's back, 593
Gonococcus infection, 32, 60
  myositis due to, 55
Gonorrhœa, cause of pain in chronic lumbago, 247
  cause of sciatica, 11, 363
  complicated by myalgias, 37
  complications of, 30
  infection in sciatica, 303
Gonorrhœal arthralgia, 136
  arthritis, 141
  radicular sciatica, 352
  rheumatism, 28, 32
  sciatica, 348
Gout and brachialgia, 378
  cause of sciatica, 363
  chronic polyarticular, and chronic fibrous rheumatism, 146
    skiagraphy of, 147
  etiological factor of fibrositis, 60
  family history in, 133
  latent, 27
  polyarticular, chronic, 146
  relation of, to fibrositis, 25
  in relation to sciatica, 302
  traumatic causes, 84
  withdrawal of, from rheumatic category, 4
  treatment of, 433
Gouty stigmata in various types of fibrositis, incidence of, 27
Gowers' test in diagnosis of trunk sciatica, 321
Gravel soil, 68
Graves's disease, coexistence of, with chronic articular rheumatism, 123
"**Growing** pains," 34
Guaiacum, use of, 440
Gummata, peribursal, of knee, 548
  perisynovial, of knee, 548
  perisynovial and peribursal, diagnosis of, 638
Gymnastics, strains due to, 579

Hæmaturia after spine injury, 589
Hæmophilic arthritis, 143

Hallux valgus, diagnosis of, from crural fibrositis, 285
Hand, condition in periarthritic fibrositis, 121
  distortion of, 92
    in fibrous rheumatism, 130
  infection of, complicating acute brachial fibrositis, 219
  lesions in fibrous rheumatism, 143
  œdema of, 220
Hayem, apprehension contracture of, 218
HCl, excess of, cause of chronic rheumatism, 42
  free, diminution or absence of, cause of chronic rheumatism, 41
Headache, "indurative," 212, 214
  "rheumatic," 215
Heart, effect of acute rheumatism on, 34, 36. *See also* Endocarditis
Heat, application of, in articular fibrositis, 454
  dry, in relief of pain, 465
  moist, in relief of pain, 465
  in relief of pain, 495
Heberden's nodes, 125
Heel, painful, 571
  diagnosis of, from crural fibrositis, 285
Heredity, influence of, 27, 29
  neuropathic, in primary sciatica, 301
Herpes zoster, diagnosis of, from lumbago, 243
  diagnosis of, from pleurodynia, 258
High-frequency currents in subacute articular fibrositis, 479
Hip, disease of, diagnosis of, from sacro-iliac relaxation, 673
  dislocations of, 629
  osteo-arthritis of, 342, 376
    differential diagnosis of, 646
    sciatica and, 305
  villous arthritis of, local treatment, 654
  villous synovitis of, 639
    clinical account, 639
    diagnosis, 645
    differential diagnosis, 646
    local tenderness, 640
    subjective symptoms, 639
Hip-joint, osteo-arthritis of, diagnosis of, from sciatica, 366
    pain in, 366
  tuberculous disease of, diagnosis from sciatica, 367
Historical retrospect, 1
Horses, muscular rheumatism in, 100
  rheumatism in, 34
Hot-air baths, prophylactic usage by, 428
  technique of, 427
  varieties of, 426
House, aspect of, in treatment of fibrositis, 407
Humidity combined with low temperature, 62
Hydrarthrosis, bilateral, diagnosis of, from synovitis of knee, 637
  infective, 119
  intermittent, diagnosis of, from synovitis of knee, 637
Hydrotherapy, beneficial or adverse effects of, on metabolism, 425
  general, in fibrositis, 419
  in chronic forms of fibrositis, 507
  in chronic stages of sciatica, 523
  in treatment of villous synovitis of knee, 654
  local, in articular fibrositis of subacute stage, 473
  untoward results or complications of, 424
Hyperæmia in chronic forms of fibrositis, 426, 508
  in chronic stages of sciatica, 524
  in subacute articular fibrositis, 476
  in villous arthritis of hip, 655
  in villous synovitis of knee, 654
  passive, in articular fibrositis, 466
    method of application, 467
Hyperchlorhydria in muscular rheumatism, 42
Hyperidrosis, local, in acute muscular fibrositis, 502
Hyperplasia, periarticular fibrous, 51
Hyperthyroidism, 123
Hypertonus, increase in chronic myo-fibrositis, 179
  physiological, in acute myo-fibrositis, 165
Hypodermic injections in acute stages of sciatica, 517
Hypotonia in trunk sciatica, 329
Hysterical sciatica, 350

Immunization, passive and active, 441
Indigestion, intestinal, cause of chronic rheumatism, 43, 438
Indol, absorption of, 58
  toxic qualities of, 54
Indurations. *See* Nodules
Infection, bacteriological data in favour of, 46
  clinical phenomena of, 33, 39
  evidence in favour of, 29, 55
  latent, of chronic arthritis, 48
  localized foci of, in fibrositis, 134
  specific, analogies of, 31
    diagnosis of, from lumbago, 242
Infective arthritis of cervical vertebræ. 208
  arthritides, elimination of, from rheumatic category, 4
  fibrositis, classification of, 111
  origin of joint affections, 7
Influenza, cause of fibrositis, 55
  cause of sciatica, 363
  complicated by myalgias, 37
  etiological factor of fibrositis, 60
Injections, subarachnoid and epidural, 529
  subcutaneous, in chronic stages of sciatica, 526
Injury, definite history of, and fibrositis, 85
Intercostal fibrositis, 255
Intestinal canal, infections of, as cause of sciatica, 38
  derangement, cause of chronic rheumatism, 43, 438

Intramuscular nodules, development of, 35
Iodides, use of, 57, 439
Iodine applications, 469
Ionization in chronic stages of sciatica, 524
  in subacute stage of articular fibrositis, 478, 509
  in subacute stages of sciatica, 520
Iritis, rheumatic form of, 289

Jaccoud's "rhumatisme chronique fibreux," 91
  type of rheumatism, 32, 91, 130
Jacket, use in traumatic lumbago, 611
Joints, articular incongruence, 629, 635
  bones entering, relationship of, 487
  Charcot's, withdrawal of, from rheumatic category, 4
  condition of, in articular rheumatism, 113, 119
  creaking of, 129
  effusion into, 120
  fibrositis of, 21, 72, 89
  fixation, absolute or relative, 458
  fluids, cytology of, in chronic rheumatism, 47
    examination of, in chronic rheumatism, 47
  infection of, complicating acute brachial fibrositis, 219
  lesions, character of, in periarthritis, 139
    included under chronic articular rheumatism, 7
    traumatic lumbago due to, 595
  malposition, correction of tendencies to, 460
  neuroses, diagnosis of, 137
  rectification of adhesions, 488
  specific infections of, 31
  stiffness of, 471
  surgery of, 489

Katabolism, excessive muscular, 78
  muscular, influence of cold on, 80
Kidney, chronic interstitial fibrosis of, 126
  functional activity of, 438
Knee, Charcot's disease of, 142
  chronic articular rheumatism of, 119, 122
  chronic villous synovitis of, 626
  gummata of, 638
  joint, synovitis of, 482, 542
  mechanism of, 627
  osteo-arthritis of, differential diagnosis from synovitis, 637
  periarthritis of, 123
  peribursal gummata of, 548
  perisynovial gummata of, 548
  synovitis of, subacute, 546, 548
  traumatic fibrositis of, 543
  villous synovitis of, 632
    clinical account, 632
    diagnosis, 636
    differential diagnosis, 637
    objective phenomena, 633
    skiagraphy in, 635
    subjective symptoms, 632
Knee, villous synovitis of, treatment, local, 482, 653
Knee-jerks, 330
Kneeling, constant, effects of, 85

Labour, excessive, results of, 80
Labourers, chronic rheumatism in, 71, 74
Lace-workers, fibrositis in, 126, 128
Lasègue's sciatic phenomenon, 321
Latissimus dorsi, injuries of, 593, 608
Lead, action of, exposure to, 28
Leeches, use of, in acute stages of sciatica, 513
Leg. *See* Extremity *and* Crural
Ligamentary lesions, diagnosis of, in traumatic lumbago, 604
  traumatic lumbago due to, 595
  treatment of, in traumatic lumbago, 610
Ligaments, lesions of, in traumatic lumbago, 591
  sacro-iliac, strain of, diagnosis of, from lumbago, 242
  spinal, injury to, 595
Light effleurage, 584
Limb. *See* Extremity
Liniments for articular fibrositis, 469, 497
Liver, chronic interstitial fibrosis of, 126
Loin, examination of, for infiltrations in lumbago, 238
  swelling or redness of, in chronic lumbago, 247
Lordosis, physiological, diminution or increase of, 599
Lubricants, use of, in massage, 497, 504
Lumbago, 23
  acute, 241, 605, 672
  acute muscular, 230
    anatomical considerations, 230
    character of pain in, 235
    clinical account, 231
    constitutional symptoms, 233
    course and complications, 237
    differential diagnosis, 241
    etiology, 231
    general diagnosis, 238
    mode of onset, 231
    objective phenomena, 236
    prodromal symptoms, 231
    site of pain in, 233
    subjective symptoms, 233
  chronic, 244, 249
    analysis of history, 246
    course of, 246
    objective phenomena, 245
    clinical account, 244
    differential diagnosis, 250
    general diagnosis, 246
    physical examination in, 247
    static alterations in, 248
  drug treatment of, 432
  in animals, 236
  occupational influence, 71, 73, 83
  relationship of, to gout, 26
  sciatica complicating, 238
  sex incidence, 20, 23
  simple acute, 605
  simple chronic, 249, 606
  static, 250

- **Lumbago**, statistics of, 73
  - systematic exercises in, 501
  - traumatic, 241, 250, 588
    - anatomical lesions, 590
    - clinical account, 592
    - course of disease, 595
    - diagnosis of, 602
    - differential diagnosis of, 605
    - disorders of mobility in, 600
    - due to articular lesions, 595
      - ligamentary lesions, 595, 610
      - osseous lesions, 595
    - etiology, 588
    - malingering in relation to, 612
    - muscular disabilities in, 593
    - objective phenomena, 598
      - signs, 594
      - tenderness in, 618
    - skiagraphy in diagnosis, 601
    - static abnormalities, 599
    - strain of muscles in, 592, 607
    - treatment, 433, 607, 610
- **Lumbar** caries, diagnosis of, from chronic lumbago, 252
  - fibrositis, 26
  - muscles, lesions of, 584
  - osteomyelitis, 243
  - spondylitis, 368, 606
- **Lumbar** transverse process, elongation of, 606
  - vertebra, fifth, compression fracture of, 598
  - vertebræ, fracture of, 591, 598
    - hypertrophic arthritis of, diagnosis of, 252
    - malignant disease of, 253
      - cause of sciatica, 307
- **Lumbo-abdominal** neuralgia, 243, 271

- **Malaria**, cause of sciatica, 363
  - infection in sciatica, 303
  - sciatic neuralgia following, 314
- **Malingering**, physical examination in, 615
  - relation to traumatic lumbago, 612-614
- **Malposition** of joint, correction of tendencies to, 460
- **Marrow** of long bones, alterations in, 93
- **Massage**, Aix and Vichy, in fibrositis, 423
  - douche, dry, 475
  - in acute muscular fibrositis, 498
  - in articular fibrositis, 471, 550
  - in chronic forms of fibrositis, 503
  - in chronic stages of sciatica, 522
  - in fibrositis, 417
  - in strains, 584
  - in subacute stages of sciatica, 519
  - in villous arthritis of hip, 655
    - synovitis of knee, 653
  - of muscles, derivative or centripetal, 471
  - technique of, in acute cases, 499
  - use of lubricants and, 504
  - vibratory, 507
- **Meningitis**, cervical hypertrophic, in chronic fibrous rheumatism, 143
- **Menopause**, synovitis after, 627
- **Menzer's** serum, 442
- **Meralgia** paræsthetica, 284, 375
- **Merck's** streptococcal vaccine, 448
- **Metabolism**, factors in, 81
  - hydrotherapy effects on, 425
  - muscle, anomalies of, and fibrositis, 87
- **Metatarsalgia**, diagnosis of, from crural fibrositis, 285
- **Meteorological** factors, 63, 65, 194
- **Micrococcus** rheumaticus, 443
- **Microdentalis**, bacillus, 47
- **Mineral** waters in treatment, 408, 414, 416
- **Miners**, chronic rheumatism in, 71, 74
- **Minor's** method, 326
- **Mobility**, disorders of, in sacro-iliac relaxation, 667
  - of joint, limitation of, in villous synovitis of hip, 642
- **Morphia**, subcutaneous injections of, 436
- **Movements**, passive, in acute myo-fibrositis, 163
  - in chronic stages of sciatica, 522
  - in subacute stages of sciatica, 519
- **Mud** baths, 428
- **Muscles**, alteration in tone of, in acute myo-fibrositis, 164
  - antagonistic, bearing of reciprocal innervation of, 191
  - atrophy and flabbiness of, in traumatic lumbago, 618
  - changes in, in chronic fibrous rheumatism, 92
  - chronic rheumatism involving, 47
  - contracture, 485
  - examination of, in myo-fibrositis, 183
  - exteroceptive impressions of, in muscular fibrositis, 193
  - fibrositis of, 22. *See also* Myo-fibrositis
  - histology of, in muscular fibrositis, 187
  - increase in volume in acute myo-fibrositis, 166
  - indurations of, 176, 180
    - in chronic lumbago, 245
  - inflammatory condition, 95
  - influence of passive movements of, in muscular fibrositis, 190
    - of synergic action, 190
  - intensity of response of, 189
  - lesions of, in traumatic lumbago, 590
  - metabolism, anomalies of, and fibrositis, 87
  - nodules in chronic myo-fibrositis, 176
    - consistency of, in chronic myo-fibrositis, 177
    - form and site of, in chronic myo-fibrositis, 177
  - objective changes in acute myo-fibrositis, 164
  - of lower extremity, strain or rupture of, 582
  - of trunk, strain or rupture of, 583
  - of upper extremity, rupture of, 579
  - palpation of, stages of, in myo-fibrositis, 184
  - pathological changes in nodules of, 96, 99
  - physiology of, in muscular fibrositis, 187
  - reaction of, to rest, 193
  - rheumatic, altered reaction in, 189
    - reaction of, to exertion, 192

Muscles, rupture of, in traumatic muscular fibrositis, 578
  scapulo-humeral group, rupture of, 579
  strain or rupture of, cause of lumbago, 241
    in traumatic lumbago, 592
    treatment in traumatic lumbago, 607
  tone, increase of, in chronic myo-fibrositis, 179
    in muscular fibrositis, 188
  variations of temperature in, 194
Muscular atrophy, progressive, in chronic fibrous rheumatism, 143
    in trunk sciatica, 328
  contractions, localized, in diagnosis of myo-fibrositis, 186
  disabilities in traumatic lumbago, 593
  exercise, insufficient, 81
Muscular fibrositis, 94
    acute, massage in, 498
      prevention of recurrence, and prophylaxis, 502
      types of, 493
    anatomical lesions of, 291
    chronic, forms of, 503
      measures suitable for, 422
      special modes of treatment, 510
    histology of muscles in, 187
    local therapy, 493
    nodules in, 291
    pathogeny of, 187
    prognosis of, 290
    proprioceptive impressions in, 188
    region of head and neck in, 201
    regional or localized varieties, 199
    sex incidence, 20
    statistics of, 72
    subacute stages, measures suitable for, 421
    summary of, 194
    traumatic, 578
      strain or rupture of muscles in, 578
    Virchow's view of, 95
  hypotonia in sciatica, 329
  katabolism, excessive, 78
  lesions, diagnosis of, in traumatic lumbago, 603
  overaction, cause of fibrositis, 78
Muscular rheumatism, 9, 153
    acute types of, 55
    comparative morbid anatomy of, 100
    differentiation of, 3
    endocarditis in, 34
    infective types, 9
    occupations and, 71
    static types, 10
    summary of pathology of, 101
    traumatic types, 10
    See also Myo-fibrositis
  spasm, 485
  system and radicular sciatica, 356
  types of fibrositis, drug treatment, 432
    of infection, 32
    of occupations, 83
  weakness in trunk sciatica, 328
Myalgia lumbalis, 230
  musician's, 581
  occupational, 387
Myalgia lumbalis, occupational, diagnosis of, from chronic brachial fibrositis, 226
    from crural fibrositis, 282
Myocardial lesions of fibrositis, 288
Myo-fibrositis, acute, clinical account, 153, 158
    complications of, 168
    course of disease, 166
    general clinical features, 162
    generalized type, 158
    local phenomena, 160
      rise of temperature in, 158, 166
    localized types, 162
    mode of onset and course, 158, 162
    objective changes in muscles in, 164
    pain in, 163
    passive movements in, 163
    subjective symptoms, 163
    synergic action in, 164
    variety, 156
  chronic, 170
    character of pain in, 172
    clinical features, 170
    complications and secondary effects in, 180
    muscle nodules in, 176
    myositic deposits in, 175
    objective phenomena of, 174
    panniculitic deposits in, 175
    site of pain in, 172
    symptoms in relation to nodules in, 178
    tendon nodules in, 178
  classification of, 155
  complications and sequelæ of, 157
  definition of, 154
  differential diagnosis of, 186
  muscular rheumatism, 153
  nodules in, physical examination of, 182
  nomenclature of, 154
  plan of procedure, 156
  subacute or chronic type, 156
  See also Muscular rheumatism
Myositic deposits in calf, 279
  in chronic myo-fibrositis, 175
Myositis in forearm, 225
  interstitialis, 154
  ossificans, traumatic, diagnosis of, 254
  rheumatic, 36, 38

Nasal, post-, catarrh, 41
Neck, chronic fibrositis of, 209
  fibrositis of, 24
  stiff. *See* Torticollis
Neoplasms, intrapelvic, sciatica and, 305
Nephritis, chronic interstitial, in chronic fibrous rheumatism, 124
Nerve arthropathies, 143
    withdrawal of, from rheumatic category, 4
  nutrition of, fine disturbances in, 105
  sciatic, anatomical relationship of great, 310
  sensitiveness of, to extension, in trunk sciatica, 321
  sheaths, chronic rheumatism involving, 47
    fibrositis of, 102

Nerve sheaths, involvement in acute brachial fibrositis, 220
  trunk, tenderness in trunk sciatica, 320
  types of fibrositis, chronic, measures suitable for, 422
    subacute stages, measures suitable for, 421
Nerves, radicular sciatica involving, 355
Nerve-stretching, bloodless, in chronic sciatica, 531
Neuralgia, brachial, 221, 386
    clinical account, 379
  crural, 373
    local therapy, 533
  external cutaneous, or meralgia paræsthetica, 375
  intercostal, diagnosis of, from pleurodynia, 258
  lumbo-abdominal, differential diagnosis of, 243, 271
  osteo-periosteal, 110, 114, 138
  sciatic, 312, 360
  so-called gouty or rheumatic, 38
  versus neuritis, 298
Neuralgias, diagnosis of, 375
Neuralgic rheumatism, infective types, 11
  traumatic types, 11
Neuralgic types of fibrositis, 85, 435
  of infection, 38
Neurasthenia, diagnosis of, from crural fibrositis, 286
Neuritides, so-called rheumatic, 38
Neuritis, brachial, 222, 381, 386
  crural, general, 376
  interstitial, 103
  local therapy, 526, 533
  sciatic, 316
    pain in, 360
  trunk, 327
  versus neuralgia, 298
Neuro-fibrositis, 102, 512
  age and, 389
  constitutional state in, 389
  general prognosis, 389
  historical retrospect, 295
  local therapy, 512
  neuropathic disposition in, 389
  nomenclature of, 297
  occupation and, 390
  pathological process in, 389
  variations according to anatomical site of disease, 390
Night pains, 115
Niton, potency of, 408
Nodules, detection of, in crural fibrositis, 281
  due to strains, 579, 581
  effect of exercise on, 79
  excision of, in chronic fibrositis, 510
  fibrous, location of, in trunk sciatica, 324
  formation of, 61
  in acute myo-fibrositis, 168
  in chronic torticollis, 210, 212
  intramuscular, 35
  muscle, form and site in myo-fibrositis, 176
  pathological changes in excised specimens, 96, 99
Nodules, periosteal, 99, 183
  physical examination of, 182
  site of, in cephalalgia rheumatica, 212
    in fibrositis of abdominal muscles, 267
    in gluteal fibrositis, 276
    in muscular fibrositis, 291
  subcutaneous, 99
  symptoms in relation to, 178
  tendon, 178, 185
    in chronic lumbago, 246
  without symptoms, 85
Nomenclature of myo-fibrositis, 154
  of neuro-fibrositis, 297
  of rheumatism, 13

Obesity, diet in, 400
  synovitis due to, 632, 634
  villous synovitis complicated by, 652
Obturator neuralgia, 375
Occupation, environmental circumstances of, 73
  in muscular fibrositis, 292
  influence of, on fibrositis, 70, 73
    in localizing seat of affection, 82
  kyphoses, round shoulders and, diagnosis of, 260
  myalgias, diagnosis of, from brachialgia, 387
      from chronic brachial fibrositis, 226
      from crural fibrositis, 282
  neuro-fibrositis and, 390
  primary sciatica and, 301
  sedentary, 84
  strains due to, 580
  tables of, 71
Opsonic reaction, 46, 441
Oral sepsis, 41, 393
Osteo-arthritis, generalized, insidious forms of chronic fibrous rheumatism, 145
  of hip-joint, diagnosis of, from sciatica, 366
    differential diagnosis of, 646
  of sacro-iliac synchondrosis, diagnosis of, 253
  relationship of villous synovitis to, 644
  of shoulder, 545
    diagnosis of, from chronic brachial fibrositis, 228
  skiagraphy of, 147
Osteomyelitis, acute lumbar, diagnosis of, from lumbago, 243
  of sacrum, diagnosis of, from lumbago, 243
Osteo-periosteal neuralgia, 110, 114, 138
Osteophytic outgrowths in chronic fibrous rheumatism, 92
Osteotomy for deformity of knee, 489
Oxaluria, backache of, diagnosis of, from chronic lumbago, 251

Pachymeningitis, hypertrophic cervical, 222
Pain, articular, in villous synovitis of hip, 639
  associated lumbar, in villous synovitis of hip, 641

- **Pain**, character of, in acute muscular lumbago, 235
  - in brachial neuralgia, 380
    - neuritis, 382
  - in chronic myo-fibrositis, 172
  - in fibrositis of abdominal muscles, 267
  - in pleurodynia, 256
  - in sciatic neuritis, 318
- distribution of, in brachial neuralgia, 380
  - in chronic lumbago, 247
- due to deformities of feet, 10
  - neuralgia or neuritis, in sciatica (?), 360
- erratic incidence of, 136
- in acute myo-fibrositis, 163
- in chronic articular rheumatism, 113
- in loins in acute muscular lumbago, 238
- in osteo-arthritis of hip-joint, 366
- in sacro-iliac relaxation, 663
- local, in sacro-iliac relaxation, 664
- paths of distribution, 640
  - in sciatic neuritis, 318
- physical examination for, in malingering, 616
- referred, 285
  - due to hip disorder in fibrositis, 137
  - from visceral disorders, diagnosis of, from chronic brachial fibrositis, 228
  - in sacro-iliac relaxation, 664
  - in synovitis of hip, 640
  - in villous synovitis of hip, 640
  - visceral, in acute brachial fibrositis, 223
- relief of, 436
  - by douches, 474
  - by hydrotherapy, 507
  - in acute stages of bursitis, 573
  - in acute types of articular fibrositis, 454
  - in acute types of muscular fibrositis, 493
  - in articular fibrositis, 465
  - in traumatic fibrositis, 549
  - methods, in chronic stages of sciatica, 530
- sciatic, due to static deformities, 371
- site of, in acute articular torticollis, 207
  - in acute muscular lumbago, 233, 240
  - in chronic lumbago, 247
  - in chronic myo-fibrositis, 172
  - in fibrositis of abdominal muscles, 266
  - in gluteal fibrositis, 275
  - in pleurodynia, 256
  - in radicular sciatica, 353
  - in sciatic neuritis, 317
  - in sciatic neuralgia, 313
  - in topographical diagnosis of sciatica, 359
  - in traumatic lumbago, 592
  - in villous synovitis of hip, 639
- **Palm**, excavated appearance of, 128
- **Palmar** fascia, implication of, 144
  - fibrositis, 126
- **Palpation** of muscles of loin in chronic lumbago, 248
- **Panniculitic** deposits, 182
  - in chronic myo-fibrositis, 175
- **Paræsthesia** in sciatica, 327
  - sensory, 128
- **Paralysis**, circumflex, differential diagnosis of, 569
- **Patellar** bursitis, 571
- **Patient**, arrangement of, for examination of muscles, 183
  - preparation of, for massage, 505
- **Peat** baths, 428
- **Pectoral** muscles, indurations of, 257
- **Pelvic** bones, disease of, in relation to sciatica, 306
  - causes of sciatica, 305
  - disorders in women, backache from, diagnosis of, 251
- **Pelvis**, displacement of, in sciatic scoliosis, 337
  - distortions of, rare, in sciatic scoliosis, 338
  - rachitic, in sacro-iliac relaxation, 662
  - relationship to synovitis, 628
- **Periarthritic** type of chronic articular rheumatism, 116
  - of chronic rheumatic arthritis, 110
- **Periarthritis**, acute, diet in, 395
  - age and sex incidence, 139
  - character of joint lesions in, 139
  - course of, 139
  - differential diagnosis, 140
  - etiology of, 139
  - infective arthritis of undifferentiated type, 139
  - mode of invasion in, 139
  - sequelæ of, 139
  - types of, 453
- **Periarticular** adhesions in subacute synovitis of shoulder, 544
  - fibrositis, 90
- **Perimetritis**, cause of sciatica, 306
- **Perineuritis**, 103
- **Periosteal** nodules, 99
  - in myo-fibrositis, 183
- **Periosteum**, changes in, in fibrositis, 91
- **Periostitis**, syphilitic, diagnosis of, from sciatica, 369
- **Peroneal** sciatica, 85, 343
- **Perspiration**, excessive, 80
- **Petechial** eruptions, 34
- **Phagocytic** reaction, 46
- **Pharyngitis**, 41
  - cause of relapses, 86
  - chronic, fibrositis and, 287
- **Phylacogens**, 448
- **Pianists**, myalgia of, 581
- **Plantar** fascia, implication of, 144
  - neuralgia, 345
  - reflex in radicular sciatica, 356
- **Plate's** method, 323, 338
- **Pleurisy**, differential diagnosis of, 258, 271
- **Pleurodynia**, character of pain in, 256
  - clinical account, 255
  - differential diagnosis of, 258
  - objective signs of, 257
  - site of pain in, 256
- **Plumbism**, 29
- **Pneumococcal** arthritis, 142

Polyarthritis, gonorrhœal, mimic of chronic fibrous rheumatism, 145
Polyarticular gout, chronic, 146
  variety of chronic fibrous rheumatism, 129
Polytenosynovitis, generalized type of, 121
Popliteal nerve, relation to sciatica, 311, 343
Posterior tibial nerve, relation to sciatica, 311
Post-scarlatinal rheumatism, organism of, 30
Posture, adaptation of, in trunk sciatica, 325
  habitual, 84
  in acute muscular lumbago, 240
  in articular fibrositis, 454
  See also Attitude
Pregnancy, etiological factor of sacro-iliac relaxation, 658
Pressure, external, cause of sciatica, 304
  factor in gout and rheumatism, 127
  sciaticas, 86
  stimuli of, 194
  sensitiveness to, 185
  tenderness to, 267, 323
Prognosis of chronic articular rheumatism, 148
Prophylaxis, 502
Protein disintegration, 54
"**Pseudo-rhumatisme** infectieux," 4
"**Pseudo-rhumatisme** tuberculeux," 10
Psoas muscle, myalgia of, 323
  sensitiveness of, in trunk sciatica, 323
Purin bodies, 26, 398
Pyorrhœa alveolaris, 41
Pyrexia of irregular or septic type, 31

Quadriceps extensor, rupture of, 583
  muscle, lesions of, 586

Radicular sciatica, 344, 351
  clinical account of, 353
  diagnosis of, 361
  etiology of, 351
  muscular system and, 356
  objective sensory changes in, 353
  reflexes affected in, 356
  sex and, 353
  summary of clinical phenomena of, 358
  types of brachialgia, 383
Radio-active waters, comparison of artificial and natural, 416
    in alimentary disorders, 414
    in treatment of fibrositis, 408
    suggested bactericidal power of, 415
    therapeutic action and application, 414
Radio-activity of atmosphere, 64
Radium, emanation of, 64
  activation of the body ferments by, 411
  antiphlogistic action of, 412
  biological effects in fibrositis, 411
  increased excretion of uric acid by, 413
  influence on uric acid metabolism, 412
  inhalation of, in fibrositis, 410
  oral administration of, in fibrositis, 410
  physical properties of, 408
  physiological action of, 410
Radium, relief of pain by, 530
Reactions, electrical and reflex, in trunk sciatica, 329
Recklinghausen's disease, diagnosis of, from chronic brachial fibrositis, 229
Recti muscles, rupture of, 584, 587
Reflex reactions, alteration in, 329
Reflexes, effect of radicular sciatica on, 356
Relapses, determining causes of, 86
Residence, choice of, 406
  treatment of fibrositis and, 404
Rest in brachialgia, 533
  reaction of muscles to, 193
Rest and fixation in acute stages of sciatica, 513
    in acute types of articular fibrositis, 453
    in relief of pain of acute muscular fibrositis, 493
    in treatment of acute types of sacro-iliac relaxation, 673
Retrorectal injections in chronic stages of sciatica, 530
Rheumatic bursitis, 553
  dendritic synovitis, 8
Rheumatism in animals, 69
  clothing suitable for, 402
  modern significance of term, 5
  neuralgic, 11
  origin and use of term, 1
  subacute, 35
  See also under Acute, Chronic, Muscular, etc.
"**Rhumatisme** chronique fibreux," 6, 13, 32, 91, 130, 492
"**Rhumatisme** chronique ostealgique," 114
Rib, cervical, brachialgia associated with, 12
Rider's sprain, 582
  treatment of, 586
Rubefacient and counter-irritant applications, 497, 516
Rupture of muscles, 578

Sacro-iliac joints, injury to, 597
    tuberculous disease of, diagnosis of, from sciatica, 367
Sacro-iliac ligaments, strain of, differential diagnosis of, 242, 368
Sacro-iliac relaxation, 656
    acute types, treatment, 673
    clinical account, 662
    considerations, 656
    course of disease, 667
    diagnosis of, 668
    differential diagnosis, 672
    etiology of, 657, 659
    objective phenomena, 665
      signs, 669
    skiagraphy in, 670
    subacute or chronic types, 674
      local treatment, 675
    subjective symptoms, 663, 669
    treatment of, 673
Sacro-iliac synchondrosis, osteo-arthritis of, diagnosis of, 253
Sacrum, osteomyelitis of, diagnosis of, from lumbago, 243

Salicylate of soda, intravenous injection of, 431
Salisbury diet, 399
Sanitary defects, cause of fibrositis, 69
Saphenous nerve, relation to sciatica, 311
Sarcomata, pain in, 137
Scapula, malpositions of, differential diagnosis of, 261
Scapular rheumatism, atrophic, 220
Scapulo-humeral fibrositis, 164
  group of muscles, rupture, 579
Scarlatinal, post-rheumatism, 30
Sciatic artery, aneurysm of, diagnosis of, from sciatica, 371
  nerve, great anatomical relationship of, 310
Sciatic neuralgia, 312
    abnormalities of gait in, 315
    clinical account, 312
    course and remote general effects in, 316
    malarial origin, 314
    motor phenomena, 315
    objective phenomena, 314
    site of pain in, 313
    treatment of, 528
Sciatic neuritis, 316
    aggravating factors in, 318
    clinical account, 316
    course of disease, 319
    mode of onset, 316
    site of pain in, 317
    subjective symptoms, 317
    treatment of, 526
Sciatic scoliosis, 325, 335
    additional features of, 337
    classification of, 335
    descriptive account, 337
    mode of evolution, 336
    sources of fallacy of, 341
Sciatica, 23
  acute stages, 512
  anodyne applications in, 515
  bilateral, 307, 362
  Brissaud's spasmodic type of, 349
  causes of, 11, 300, 307, 362
  chronic, local prophylactic measures, 532
    stages or types, 522
    surgical treatment, 530
    treatment of, 522
  classification of, 308
  complications of, 333
  complicating lumbago, 238
  diabetic, 347
  diagnosis of, 359
  differential diagnosis of, 366, 672
  external popliteal type of, 343
  fixation in, 514
  gonorrhœal, 348
  hysterical, 350
  idiopathic, 38
  incomplete or partial and bilateral, also those of special etiology, 343
  infections in, 302
  occupations and, 71, 73
  partial, other varieties of, 345
  pathological anatomy of fibrositis from studies of, 103
Sciatica, peroneal, 85, 343
  pressure, 86
  "pretubercular," 11, 303
  primary, 300, 363
    age incidence, 300
    differential diagnosis of, 647
    neuropathic inheritance in, 301
    occupation and, 301
    pain in, 361
    predisposing and proximate causes, 300
    sex incidence of, 300
  radicular. *See under* Radicular sciatica
  reactions in, 50
  relationship of, to gout, 26
  secondary, 365
    extrapelvic causes, 304
    intrapelvic causes, 305
    pain in, 361
  sex incidence, 20, 23
  special types of, 347
  static types of, 12
  statistics of, 73
  subacute stages, 518
  table of types, 309
  thermic applications in, 514
  topographical diagnosis of, 359
  treatment of, 512
  trunk. *See* Trunk sciatica
  vaccine treatment of, 449
  varicose, 348
Sclerosis of joint structures in fibrositis, 91
Scoliosis, alternating, 337
  crossed, detection of, 338
  factors influencing existence of, 338
  heterologous or crossed, 337
  homologous or reciprocal, 337, 341
  lateral, diagnosis of, from dorsodynia, 259
  lumbar, 599
  sciatic, 325, 335
Seasonal incidence of rheumatism, 33
Senility in relation to sciatica, 302
Sensory changes in radicular sciatica, 353
  disorders in trunk sciatica, 327
Serum-therapy in chronic articular rheumatism, 442
  of fibrositis, 441
Sex, etiological factor of fibrositis, 60
  incidence, 20
    in periarthritis, 139
    of primary sciatica, 300
  occupations and, 71
  radicular sciatica and, 353
Shoulder, acute fibrositis of, 217
  capsule, torn, differential diagnosis of, 567
  drooping of, 12
  infection of, complicating acute brachial fibrositis, 219
  joint, affections of, diagnosis of, from brachialgia, 387
    synovitis of, 541
  massage of, 550
  osteo-arthritis of, 545
    diagnosis of, from chronic brachial fibrositis, 228
  "rheumatic" bursitis of, 559
  synovitis of, differential diagnosis, 567

Shoulder, synovitis of, subacute, 544
  tuberculous disease of, 545
Shoulders, round, and occupation kyphoses, diagnosis of, 260
Skiagraphy in chronic gout, 147
  in diagnosis of traumatic lumbago, 601
  in fibrositis, 147
  in osteo-arthritis, 147
  in rheumatoid or atrophic arthritis, 147
  in sacro-iliac relaxation, 670
  in villous synovitis of knee, 635
Skin, aspect of, in trunk sciatica, 331
  exposure of, exciting cause of fibrositis, 75, 78
  sensibility in radicular sciatica, 355
Soda, salicylate of, intravenous injection of, 431
Soil, relation of, to fibrositis, 67, 69, 406
Soldiers, gluteal fibrositis in, 274
Spa treatment of fibrositis, 408
Spasmodic contraction, muscular, 165, 485
  type of sciatica, 349
Spavin, bog and bone, 629
Spinal ligaments, injuries of, 595
    strain of, 610
Spine, arthritis of, atrophic, diagnosis of, 252
  articular lumbago of, 234
  curves of, alteration in, in sacro-iliac relaxation, 661
  deformities of, suggested modes of origin of, in sciatic scoliosis, 339
  disorders of mobility of, 600, 618
  hyperæsthetic, diagnosis of, 253
  injuries of, 589
  lesions of articulations, 596
  ligamentary lesions, 604
  lumbar, hypertrophic arthritis of, diagnosis of, 252
    malignant disease of, diagnosis of, 253
  transverse process of, fractures, 597, 602
Spondylitis, lumbar, diagnosis of, from sciatica, 368
    differential diagnosis, 606
  osteo-arthritic or hypertrophic, 211
  rheumatoid or atrophic, diagnosis of, from chronic cervical fibrositis, 211
Sports, strains due to, 578
Sprains, effects of, 83. *See also under* Strain
Sprengel's deformity, 384
Static brachialgias, diagnosis of, from chronic brachial fibrositis, 226
Sterno-mastoid involved in torticollis, 205
Stiff neck. *See* Torticollis
Stiffness, joint, diagnosis of, 138
  measures to combat, 470
  relief of, by hydrotherapy, 508
"Stitch," 256
Strain of muscles, 578
  of sacro-iliac ligaments, 242, 368
  effects of, 83
Strapping, value of, 584, 608
Streptococcal infection, 51, 55, 57, 442, 445
  strains, attenuated virulence, cause of neuralgic rheumatism, 11
Streptococcal vaccines, polyvalent, 448
Streptococcus, mutation of, 36
  subinfection from, 10
Subacromial bursitis, 554
    diagnosis of, 566
  type of bursitis, treatment, 572
Subarachnoid infections in chronic stages of sciatica, 529
Subcoracoid bursitis, 562
    diagnosis of, 566
  type of bursitis, treatment, 575
Subgluteal bursitis, 570
Subinfection, evidence of, 55
  in gouty diathesis, 28
  theories of, 56, 58
Subthermal applications, value of, in fibrositis, 420
Sulphur, use of, 440
Surgical measures, 480, 490
Sweating, localized, in brachialgia, 384
Symptoms, blending or overlapping, 55
  types of, 35
Synovial tuberculosis, primary, of knee, 548
Synovitis, 31
  chronic villous, 625
    etiology, 626
    mechanism of lower extremity in, 627
    morbid anatomy, 630
    prognosis of, 647
  fleeting types, 118
  of knee, subacute, 546, 548
  of shoulder, differential diagnosis, 567
    subacute, 544
  rheumatic dendritic, 8
  subacute rheumatic, 8, 539
    and villous forms of, 13
    clinical account, 541
    diagnosis, 543
    etiology, 539
    morbid anatomy, 540
  treatment of, 548
  villous, complicated by obesity, 652
    correction of static deformities, 649
      of early or slight cases, 650
      of severe cases, 651
    of hip, 639
      diagnosis of, 645
      differential diagnosis, 646
    of knee, treatment, local, 653
Syphilitic arthralgia, 136
  arthritis, secondary, 141
  infection in chronic arthritis, 48
  osteal pains, diagnosis of, from crural fibrositis, 287
Syphilis, cause of radicular sciatica, 352
  cause of sciatica, 11, 363
  complications of, 30
  infection in sciatica, 302
  myositis in, 38

Tabes dorsalis, 138
    lightning pains of, diagnosis of, from sciatica, 370
Teeth, caries of, 41
Temperature, local rise of, in acute myofibrositis, 158, 166
  of muscles, variations in, 194

Tender points, detection of so-called, in trunk sciatica, 320
Tendinous lesions, diagnosis of, in traumatic lumbago, 603
Tendo Achillis jerk, 329
Tendon nodules, 185
    in chronic lumbago, 246
    in chronic myo-fibrositis, 178
Tendons, chronic rheumatism involving, 47
Tennis elbow, 580
  treatment of, 584
Tennis leg, 585
Thermic applications in acute stages of sciatica, 514
    in relief of pain, 495
Thigh, mechanism of, 627
  seat of radicular sciatica, 353
Throat, sore, cause of relapse in fibrositis, 87
Thrombosis of femoral vein, diagnosis of, from sciatica, 369
Thyroid gland, 39, 123
Tibia, articular incongruence, 629, 635
Tibial nerves, neuritis of, 345
Toe-joints, deformities of, 125
Tonsillitis, 41
  cause of relapses, 86
Torticollis, 34, 76
  acute, vicious attitudes in, 203
    general diagnosis of, 206
  acute articular, 204
    site of pain in, 207
  acute muscular, 201, 207
    clinical account, 202
    complications of, 204
    constitutional symptoms, 202
    course of disease, 204
    differential diagnosis, 207
    etiology of, 201
    objective phenomena, 203
  chronic, etiology, 209
  congenital, diagnosis of, 208
  reflex, diagnosis of, 207
  sequence of, 34
  spasmodic, diagnosis of, 208
  systematic exercises in, 501
Toxæmia, chronic, 44
Toxic fibrositis, classification of, 111
Transverse process, fracture of, 597
Trapezius, involved in torticollis, 203, 205
Trauma, cause of sciatica, 304
  diagnosis of torticollis from, 208
  relation of, to fibrositis, 84
Traumatic fibrositis, 539, 549, 578
  lumbago, 250, 588
  muscular fibrositis, 578
  myositis ossificans, diagnosis of, 254
  origin of joint affections, 68
  treatment of, 548
Treatment, baths in, 422, 424, 428
  climate and residence, 404
  clothing suitable in, 401
  combined serum and vaccine, 449
  diet in acute phases, 395
    in chronic cases, 396
  drugs in, 429
  general, 392
  massage and exercise in, 417
Treatment, mineral waters in, 408, 414
  of articular fibrositis, 452
  of muscular fibrositis, 493
  of neuro-fibrositis, 512
  of "rheumatic" bursitis, 553
  of traumatic fibrositis, 439
  of traumatic lumbago, 588
  of traumatic muscular fibrositis, 578
  of various types of fibrositis, 430, 437
  of villous synovitis, 649
  radio-active waters in, 408, 416
  serum, 441
  spas, use of, 408
  summary of, 450
  surgical measures, 480, 530
  vaccine, 445
Trees, value of, 407
Trunk flexion method in diagnosis of sciatica, 322
  muscles of, strain or rupture of, 583
  region of, fibrositis of, 230
  rotation of, in sciatic scoliosis, 338
Trunk sciatica, 312, 320
    alteration in reflex reactions, 329
    Bonnet's sign in, 323
    clinical account of, 312
      phenomena of, 320
    complications of, 333
    diagnosis of, 361
    duration of, 332
    electrical reactions in, 330
    Erben's sign in, 323
    Gowers' test in diagnosis of, 321
    location of fibrous nodules in, 324
    motor phenomena in, 328
    of bilateral distribution, 346
    postural adaptations and alterations of gait in, 325
    sensitiveness of nerve to extension in, 321
      of psoas muscle in, 323
    sensory disorders in, 327
    vasomotor and trophic phenomena of, 330
Tubercle, cause of neuralgic rheumatism, 11
Tuberculin tests, 49
Tuberculo-cutaneous tests, 56
Tuberculosis, infection, in sciatica, 303
  latent, 57
  primary synovial, of knee, 548
Tuberculous arthralgia, 136
  chronic arthritis, 48
  coxitis, differential diagnosis, 646
  disease of hip-joint, diagnosis of, from sciatica, 367
  disease of sacro-iliac joint, diagnosis of, from sciatica, 367
  disease of shoulder, 545
  rheumatism, chronic, 142
    so-called, 122
"**Tumeur** blanche," 122
Typhoid, cause of sciatica, 11

Underwear most suitable for "rheumatic" subjects, 402
Urates, deposition of, 79
Uric acid, increased excretion of, by radium emanation, 413

Uric acid metabolism, influence of radium emanation on, 412
Urinary changes in chronic rheumatism, 44
  hypo-acidity in chronic rheumatism, 45
Urine, acidity of, increased in chronic rheumatism, 45, 399
    relationship of gastric acidity to, 45
  analysis of, in dietetic treatment of fibrositis, 397
  bacterial content of, 119
  examination of, 135
    in chronic lumbago, 249
Urticarial eruptions, 34

Vaccine-therapy of fibrositis, 441, 446
  and serum-therapy combined, of fibrositis, 449
  treatment of, local foci in, 445
Vaccines, autogenous, 46
    control and spacing of, 447
  stock, 448
  streptococcal, 448
Valleix's points, 320
Vapour baths in fibrositis, 423
Varicose sciatica, 348
  veins, diagnosis of, in myo-fibrositis, 186
Vasomotor and trophic phenomena of trunk sciatica, 330
Veins, varicose, sciatic, 348
Vertebra, fifth lumbar, fracture of, in traumatic lumbago, 591
Vertebræ, cervical, infective arthritis of, diagnosis of, from torticollis, 208
  fracture of, 591
Vertebral articulations, lateral, lesions of, 596
Veterinary observations of muscular rheumatism, 34
Vichy and Aix massage in fibrositis, 423
Villous arthritis of hip, local treatment, 654
  synovitis, chronic, etiology, 625
      morbid anatomy, 630
      prognosis of, 647
    complicated by obesity, 652
    of hip, 639
      diagnosis of, 645
      differential diagnosis, 646
    of knee, 632
      treatment local, 653
    relationship of, to osteo-arthritis, 644
    treatment, 649
      correction of static deformities, 649
      early or slight cases, 650
      severe cases, 651
Viscera, changes in, in chronic fibrous rheumatism, 93
Visceral disorders ascribed to rheumatic influences, 3
    diagnosis of, from dorsodynia, 262
    referred pains from, diagnosis from chronic brachial fibrositis, 228
  muscular tissues, fibrositis of, 287
  pain, referred, in acute brachial fibrositis, 223
Visceroptosis, cause of chronic rheumatism, 43, 439

Weather, etiological factor, 61, 63, 194
Weight-lifting, lumbago following, 590
Wet, exposure to, cause of fibrositis, 62
Winds, chills due to, 75
  influence of, 64, 66
Women, pelvic disorders in, backache from, diagnosis of, 251
Writer's cramp, 581
Wry-neck, spasmodic, 204

X rays, relief of pain by, 530

BILLING AND SONS, LTD., PRINTERS, GUILDFORD, ENGLAND

BINDING SECT. SEP 1 5 1982

PLEASE DO NOT REMOVE
CARDS OR SLIPS FROM THIS POCKET

UNIVERSITY OF TORONTO LIBRARY

MPr Llewellyn, Llewellyn Jones and
L Jones, A. B.
Fibrositis.

BioMed

59